HiPath 3000 V6.0
HiPath 5000 V6.0

System Description

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1 Introduction

HiPath 3000/5000 V6.0, P31003-H3560-X100-1-7618, 07/05

1.1 About This Manual

This manual describes the features and hardware of HiPath 3000/5000 , which consists of the following systems:

- HiPath 3000
  - HiPath 3350/3300
  - HiPath 3550/3500
  - HiPath 3750/3700 (for existing customers)
  - HiPath 3800
- HiPath 5000

Country-specific features and released applications may vary.
The Sales Information is therefore the only document that contains a binding description of the available features and the hardware scope for your country.

1.2 Overview of HiPath 3000/HiPath 5000 V6.0

The systems included in V6.0 can be used in the following cases:

- HiPath 3000,
  whose communication systems can be used as standalone systems or as networked systems. Central administration of networks consisting of HiPath 3000 systems is not possible.
- HiPath 5000,
  HiPath 5000 is used as a central administration unit in the IP networking of HiPath 3000 systems (= multinode system, see Figure 1-2). By creating a "Single System Image", all relevant nodes can be centrally administered. HiPath 5000 is the platform for the central provision of applications, and facilitates the use of these applications by all IP networking stations. With the HiPath ComScendo service, there is also the option of using an integrated gatekeeper and HiPath ComScendo features for IP workpoint clients. Up to 1000 registered IP workpoint clients and up to 250 CorNet-IP trunks (CorNet-NQ protocol tunnelled in H.323 via annex M1) are also supported here.

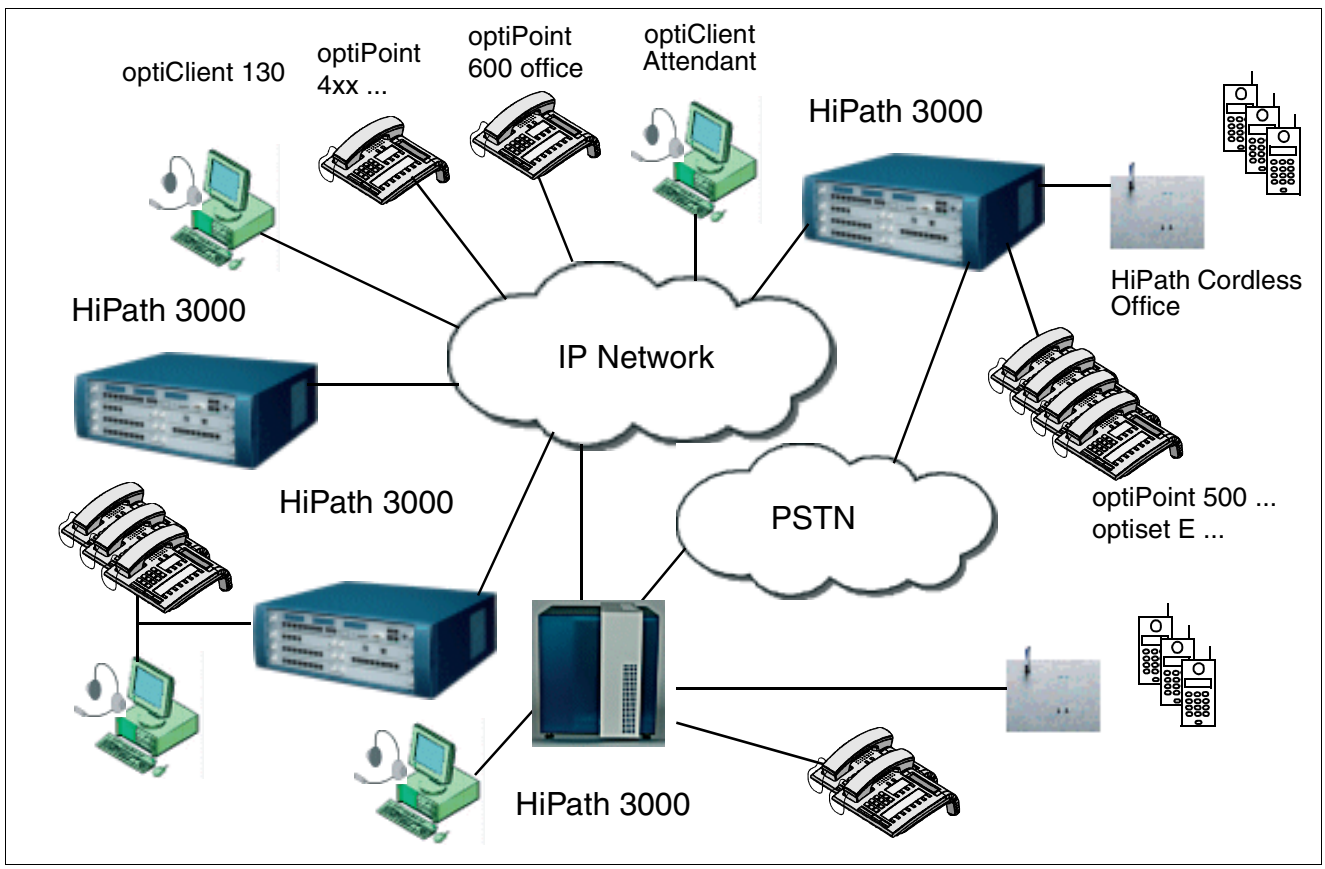


Figure 1-1 HiPath 3000 as Networked Systems

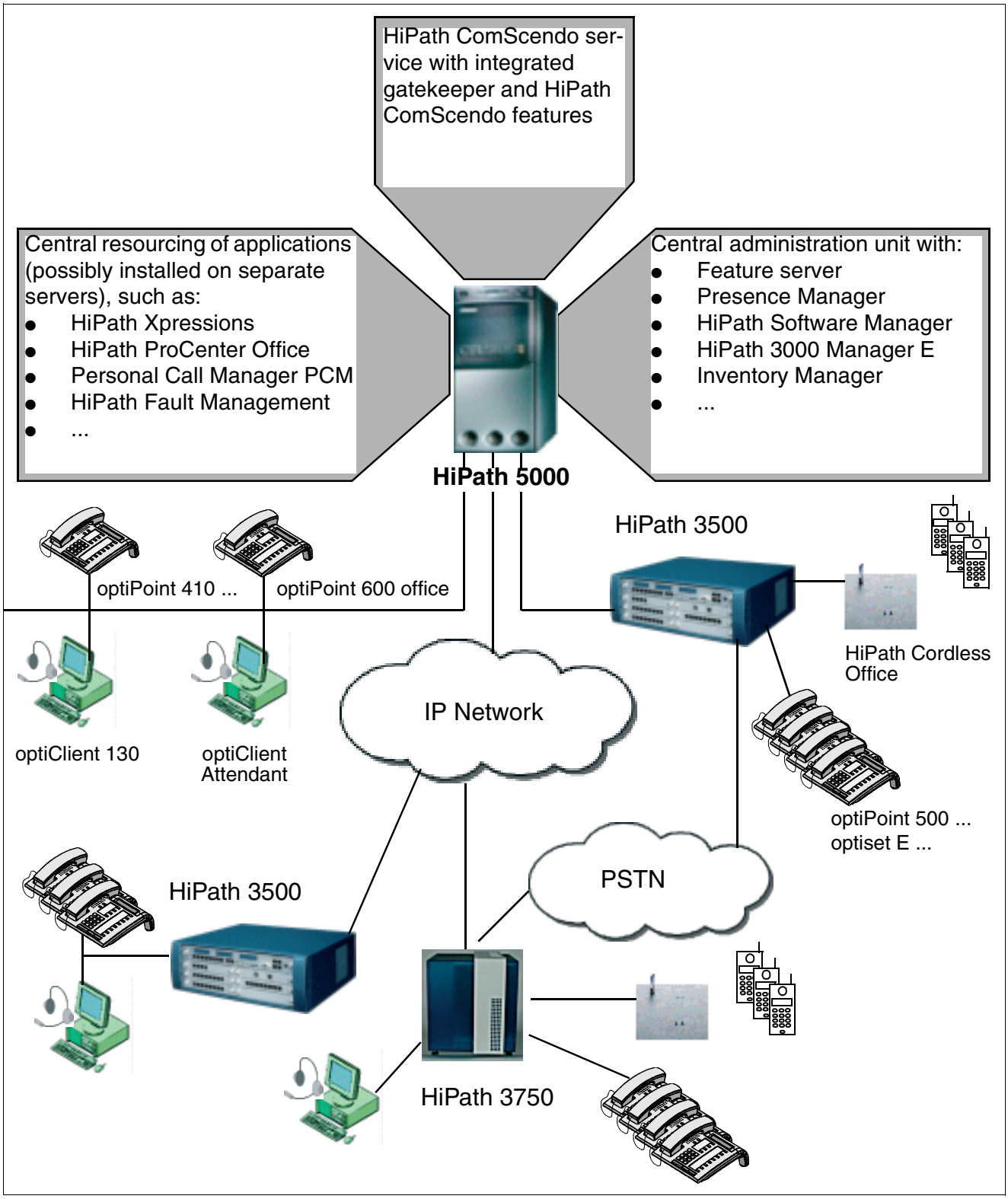


Figure 1-2 HiPath 5000 Multinode IP System

1.3 New Products

Highlights of the new version

- Automatic time-dependent class-of-service (COS) changeover
- Caller-specific ringer signaling
- Whisper
- MULAP Privacy Release
- Prerequisites for ProCenter applications
- CSTA interface enhancements: I/O services
- IP mobility
  - IP mobility expansions (emergency number)
- SIP network
  - Station
  - Features
- HiPath 3000/5000 signaling encryption
- HiPath 8000 survivable media gateway (SIP Q with HiPath 8000 V2.0 or later) ?????
- New SIP telephones
  - optiPoint 400 standard S
  - optiPoint 410 S (see Section 7.2.3)
  - optiPoint 420 S (see Section 7.2.3)
  - optiPoint 600 S (see Section 7.6.2)
  - optiClient 130 S V2.0 (see Section 7.1.1)
  - OptiPocket S
- optiPoint WL2 professional (see Section 7.8)
  - optiPoint WL2 professional S (see Section 7.8)

1.3.1 Automatic Time-Dependent Class-of-Service (COS) Changeover

In the past, class-of-service changeover was only capable of distinguishing between day service and night answer. This type of changeover applied to all stations.

The new automatic class-of-service changeover feature combines stations in so-called profiles (for example, Management, Sales). A schedule can be configured for each profile to define which COS should be used for which time period in the week.

Relationship between automatic COS and automatic night answer

The COS feature is related to the automatic/manual day service/night answer. The following restrictions apply:

- Reaching the call destination via Call Management
  This takes place via Call Management and does not depend on automatic class-of-service changeover. There are different call lists for day and night.
- Intercept destinations
  The intercept destination is only defined by the automatic/manual day service/night answer.
- COS group:
  During the night, the COS group is in a fixed (configured) relationship with the station (automatic class-of-service changeover has no impact on this).
  During the day, the COS group can either change between day times (if "Automatic COS" is set for the entire system) or be in a fixed (configured) relationship with the station (if "Automatic COS" is not set).

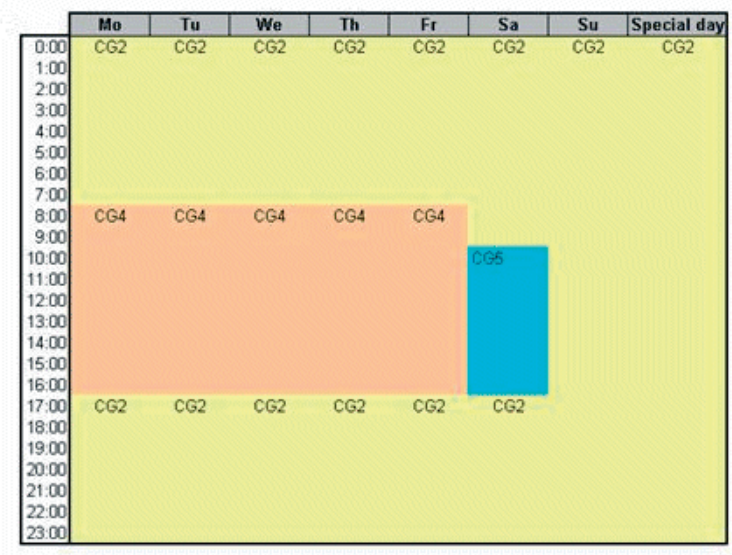


Figure 1-3 Sample Schedule

1.3.2 Caller-Specific Ringer Signaling

Different types of caller-specific ringing signals are available in V.6.0 or later.

In addition to external ringer signaling, internal ringer signaling can then be configured for every station. Every internal call set up by this station (calling station) is signaled by a specific ring type at station B (called station). The ring frequency at the destination is based on the caller's ring frequency. A station is assigned a specific ring frequency for this with Manager E. As in the existing field for external calls ("ringer signaling"), the new ring frequencies for the internal ring frequency are controlled via Manager E (not via Manager C).

The various ring frequencies are implemented at the station called if this is a HFA station (U_{p0E} or IP). Analog stations are always called with frequency 1.

CMI handsets

Only handsets with ringer melodies are supported. The calling number ID is sent to the Gigaset so that the melody selection function in the internal phonebook (VIP) is supported; this depends on whether this feature is supported by the relevant caller.

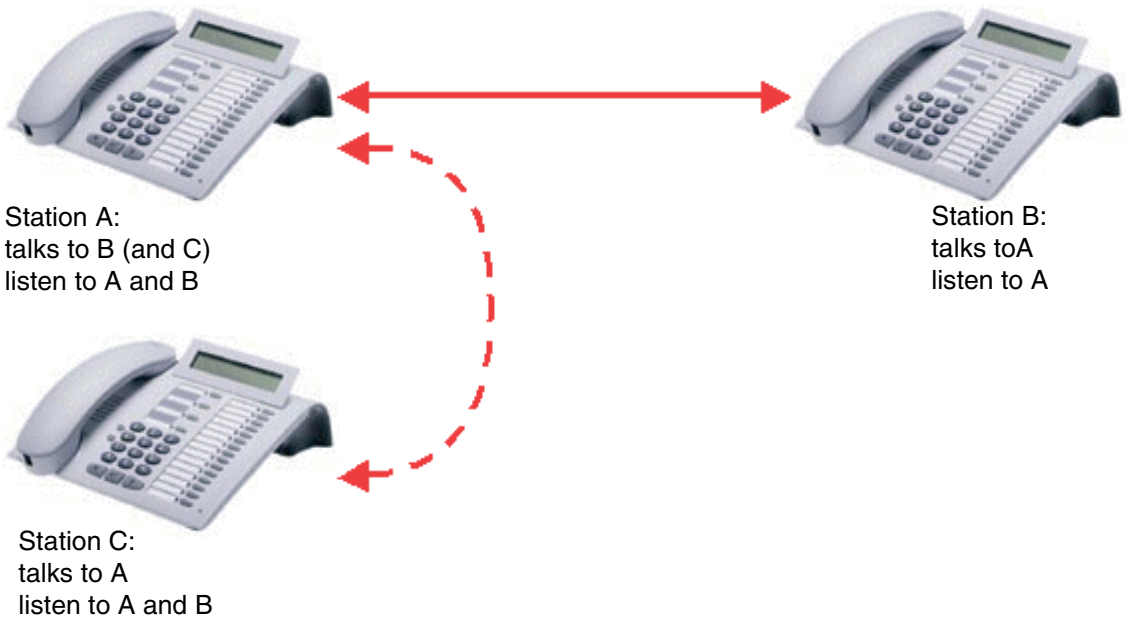
The various internal ring frequencies only operate between endpoints that are registered in the same system or node.

Seven additional ring frequencies are added to the existing ring frequency. These frequencies have different default values and every station is displayed by default with frequency 1.

1.3.3 Whisper

The "Whisper" feature allows a station (station C in the diagram) to monitor an ongoing connection between two stations (stations A and B in the diagram) and to communicate with one of these two stations. In other words, the connection is set up in such a way that station C can only be heard by station A and station B can only hear station A.

Although there is no connection between station B and station C, station B may be able to overhear what station C says as a result of feedback from station A's telephone.



Station C activates the feature by dialing a code. The telephone features a part-programmed key (only the code is programmed on the key, the station number must be suffix-dialed). The Service menu features a new menu item for this. The Idle/Call menu, on the other hand, has not been changed.

The option for activating the feature is linked to a new user-specific class of service. Station A can block the Whisper feature with a second class of service.

Restrictions

- If at least one of the participants in the original call (station A or B) is not a TDM station, the HiPath switching network is not involved at the time of activation and changeover is impossible without briefly interrupting the connection between A and B.
- Stations A and C must be in the same node.

- Station C can only activate this feature in Idle/Standby status.
- Destination terminals for the Whisper feature (station A) can only be terminals with displays controlled by the system (Optiset, OptiPoint, OptiClient).
  As in HiPath 4000, CMI is not supported.

1.3.4 Privacy Release Key (MULAP)

Version 6.0 and later incorporates a new status called "Privacy Release". A new key was created in the database for this. This key is supported by the following workpoint clients:

- optiset E
- optiPoint 400
- optiPoint 500
- optiPoint 600
- optiClient 130

If Privacy Release is activated, no other stations can perform override (no conference, no consultation hold, etc.). All stations in a MULAP group can program a key for Privacy Release.

When Privacy Release is activated it is signaled to all stations in a MULAP group by an appropriate LED. Privacy Release also works if a station is involved in a conference or even initiated it.

1.3.5 Prerequisites for ProCenter Applications

You can use a "multiple pilot station number" to access the same UCD group with different station numbers. This function is implemented by configuring a virtual station in Call Management.

The "multiple pilot station number" is treated like a "call forwarding" number; information about the "multiple pilot station number" is "delivered" by the last call forwarding destination and "queued" in the relevant UCD group. There are no events on the telephone that represent "multiple pilot station number".

1.3.6 CSTA Interface

The station can address the associated CSTA application (if this was previously registered at the HiPath system) by selecting an application ID. A registered application can address a station directly (for example, to confirm an action on the display).

You can start an I/O session with a feature code or function key. You can use the function to start, resume, and stop an I/O session; the function key LED indicates the status of the I/O session (standby, active, suspended).

During an I/O session, a subscriber can operate the application using navigation keys, the keypad, the plus/minus keys, the alphanumeric keypad (optiset Memory), the programmable keys, and the softkeys (CMI).

Up to ten applications can be simultaneously logged on to a system.

A single I/O session can only be used by one station at a time. If a session is interrupted ("suspended" status), a second I/O session can be started; the interrupted session must first be ended.

1.3.7 IP Mobility

Teleworking

- The subscriber uses the same login code and the same password at both home and office workstations.
- If the subscriber logs on at home, the IP telephone in the office registers a "non-mobile number" and can be fully used by other users.
- Only optiClients are released for use in conjunction with the home workstation (ISDN/ DSL).
- Emergency concept: If the system recognizes that an IP workpoint is out of service, it can automatically forward a caller to a CFSS destination (Call Forwarding Station out of Service) configured in the system (for example, fixed-network telephone or cell phone).

Desk Sharing

- With DeskSharing, subscribers no longer have a permanent office telephone.
- This feature permits multiple users to share a workstation. A user can access his or her personal settings by logging on to a telephone. Neutral status reappears after logoff.

1.3.8 IP Mobility Expansion (Emergency Number)

In an IP network, a mobile subscriber can be logged on either at home or at any other remote network node. In the case of an emergency call from an HFA-IP telephone that is logged on to a remote network node, the remote network node's emergency destination may not be called but rather the emergency destination of the HiPath 3000 node where the IP telephone is physically installed.

The emergency number for the IP telephone must be a destination within the HiPath network. The emergency destination can be connected to the HiPath 3000 network node either as a default telephone or as a virtual device where the feature FWD to an emergency destination (for example, the CO) is active.

A direct call cannot be made to an emergency destination in the public network, for example, because this is not supported by Deutsche Telekom.

An emergency prefix must be saved on the HFA-IP telephone. This number can be used to reach an emergency destination from any location in the network. The station dials the emergency numbers 112 or 110 and inserts the prefix.

This function is already supported by the telephones and optiClient terminals.

The emergency numbers must be configured both in the home system and in the destination system. Emergency numbers vary in different countries (for example, the emergency number is 911 in the U.S. and 112 in Germany). In this case, the emergency number for the relevant country must also be configured in the destination country's system.

1.3.9 SIP Networking

SIP networking, that is, networking based on the SIP protocol (Session Interaction Protocol) is now supported by HiPath 2000, HiPath 3000/5000, and HiPath 4000 and is finally available in version 6.0.

SIP networking offers systems:

- a gateway for PSTN for HiPath 8000 and HiPath 5000 SIP users
- a gateway for PSTN for directly connected SIP telephones
- a survivable media gateway for HiPath 8000 SIP stations
- standalone TDM gateways for OpenScape
- standalone TDM gateways for other SIP systems (for example, Vovida and/or Cisco)

In addition, SIP offers the following for HiPath 2000, 3000/5000 systems

- support for SIP station interfaces (basic call and basic features)
- SIP connection to VoIP providers
- advanced security provisions including signaling and payload encryption, even for SIP calls

The provision of a TDM-SIP gateway means that the HiPath 3000/4000 system can also operate as a SIP <-> TDM gateway. This in turn means that if HiPath 3000/4000 TDM telephones are connected to the PSTN, SIP telephones connected can be routed over the HiPath 3000/4000.

There are two types of support for SIP networking:

- Firstly, support for SIP-Q , for connections to SIP-Q-compliant systems and COs
- Secondly, support for a SIP network linking VOIP COs and other SIP-compliant systems that build on the original SIP protocol (for example, OpenScape that is based on the Microsoft LiveCommunication server and Vovida and/or Cisco).

1.3.9.1 SIP Stations

The SIP protocol (Session Initiation Protocol) is an ASCII-based signaling protocol used to configure sessions in an IP network.

The following telephones are supported:

- optiPoint 400 standard S
- optiPoint 410 S
- optiPoint 420 S
- optiPoint 600 S
- optiClient 130 S
- OptiPocket S

1.3.9.2 SIP Features

The following features are available:

- Hold
- Consultation hold
- Toggle
- Call forwarding
- Call waiting
- Call rejection
- Call forwarding
- Screened and unscreened transfer
- Do not disturb
- Local three-party conference
- Mute
- Music on hold
- Missed calls list
- Number redial
- Speed dialing (10 entries)
- Name-based dialing
- Hotline
- Call waiting display

1.3.10 Signaling Encryption/Payload Encryption

The signaling stream and the data stream are encrypted to guarantee the highest level of privacy protection. Software encryption forms based on international standards are basically used for this.

The encryption of signals is known as **signaling encryption**. In this case, the necessary signaling data stream is encrypted on the basis of the standard AES CM with 128 bits.

Payload encryption is when the data stream is encrypted. Encryption is performed with the standard SRTP/SRTCP. As described in this standard, the algorithm AES CM with 128 bits is used for symmetrical data stream encryption.

The DLS (Deployment and License Service) uses a pseudo random function to create the PSS (PreSharedSecret) with a key length of 128 bits. The PSS is distributed to the entities by DLS over https (AES CM with 128 bits).

The secrets needed for signaling encryption and payload encryption are derived by the entities from the PSS already distributed. The standard **SHA-1** is used for this.

Standard SRTP

The protection of mobile data communication is only one side of the coin. To work with convergence solutions, mobile workers are also increasingly using Voice over IP and, for lack of any better alternatives, public hotspots mostly accessible over WLAN. As this involves data communication, VoIP can be processed in the same way over an IPsec-based VPN. However, the Secure Real Time Protocol (SRTP) which is based on the standard RFC 3711 now offers a simpler alternative in which both signaling data and user data is encrypted with AES, without affecting the voice transmission quality. As an end-to-end protocol, SRTP is also independent of the underlying infrastructure which means it can be used in public environments. SRTP can also be used on the company campus to protect internal calls conducted over WLANs. As SRTP is a very new protocol, it does not yet enjoy widespread vendor support; Siemens, however, supports a complete solution based on the HiPath platform that also supports roaming between multiple hotspots.

HiPath 3000/5000 V6.0 and HiPath 4000 V3.0 combined networks

The basic requirement for end-to-end security encryption is HiPath 3000/5000 V6.0 or later and HiPath 4000 V3.0 or later. The system upgrade is software-based. The hardware can continue to be used depending on the version. A ComScendo security license is available for security. The licenses are for IP stations and B channels for the IP network.

1.3.11 Licensing

Versions 5.0 and later of HiPath 3000 and HiPath 5000 use a new, centralized licensing procedure known as the License Management System. The procedure is used in all HiPath products, for example communication systems, workpoint clients, and applications.

To license a product you must first establish a connection with the Central License Server (CLS) via the Customer License Manager (CLM). The customer-specific data entered is used to uniquely identify the product configuration for which the relevant license file is to be supplied in encrypted format. The license file contains the licenses for all licensed products.

The CLM is responsible for activating the license file and allocating it to the Customer License Agent (CLA). This is where the license data is validated. Distribution of the licenses to the individual products using HiPath 3000 Manager E can then begin.

All licenses that can be ordered for HiPath 3000 V6.0 are handled by the HiPath License Management.

The following licenses are available for HiPath 3000 V6.0:

- optiClient Attendant V7.0/Upgrade optiClient Attendant to V7.0
- ComScendo license for IP workpoints
- S2M License for releasing B channels
- HG 1500 V3.0 B channels
- HG 1500 V3.0 VPN (Virtual Private Network)
- HG 1500 IPSec
- HG 1500 LWCA (Light Weight Certification Authority)
- BS4 License for releasing traffic channels
- License for an Xpressions Compact-based announcement
- HiPath TAPI 120 V2.0, HiPath TAPI 170 V2.0

Please refer to the relevant sales information for information on licenses for applications and IP clients that can be connected.

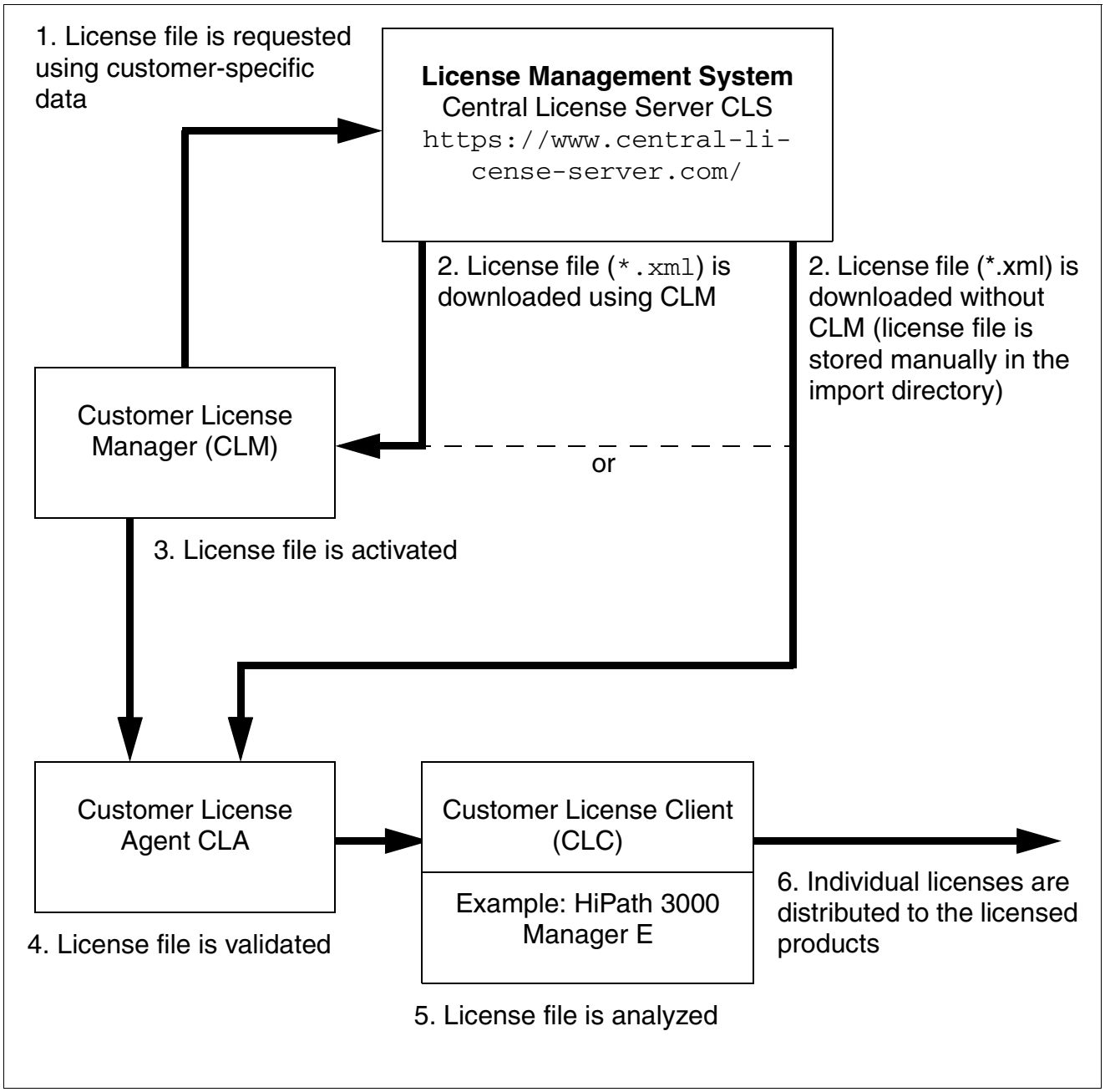
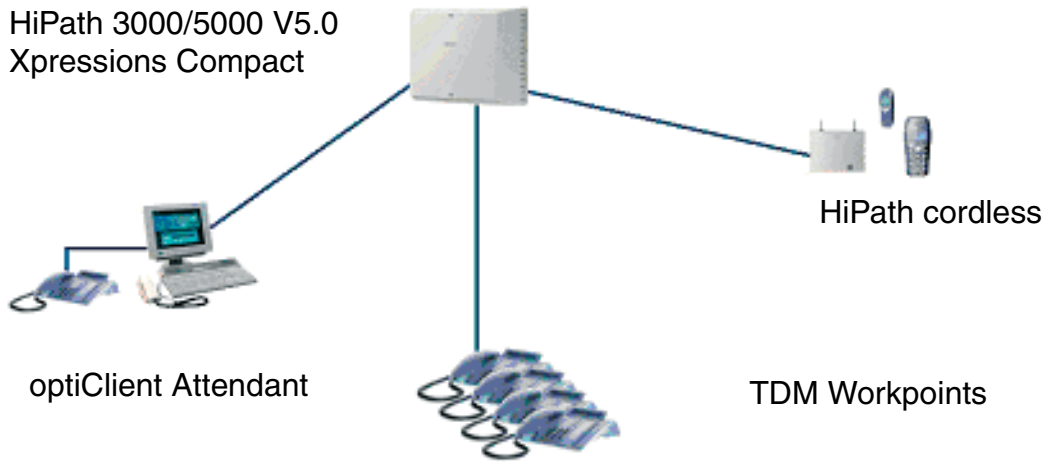

1. License file is requested using customer-specific data
License Management System
Central License Server CLS
https://www.central-license-server.com/
2. License file (*.xml) is downloaded using CLM
2. License file (*.xml) is downloaded without CLM (license file is stored manually in the import directory)
Customer License Manager (CLM)
or
3. License file is activated
Customer License Agent CLA
Customer License Client (CLC)
Example: HiPath 3000 Manager E
6. Individual licenses are distributed to the licensed products
4. License file is validated
5. License file is analyzed

Figure 1-4 Licensing Process with Central License Server (CLS)

System licensing?????

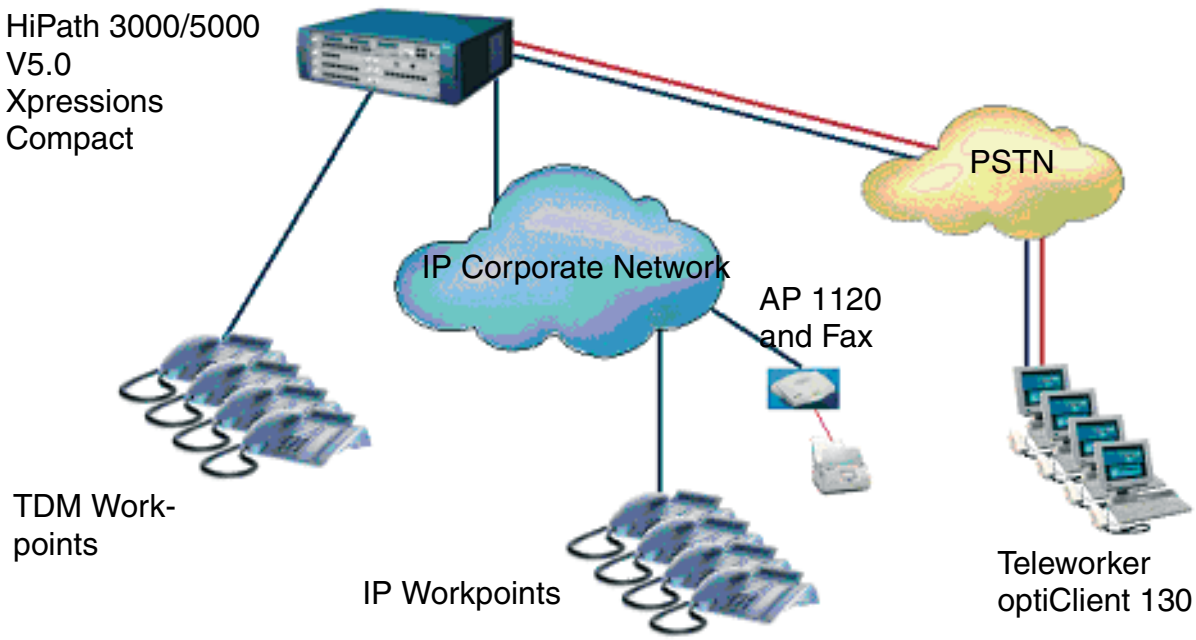
1.3.12 Application and Networking Scenarios

1.3.12.1 HiPath 3000 standalone (TDM)



In this scenario, HiPath 3000 is implemented as a standalone system in the traditional telephone infrastructure environment.

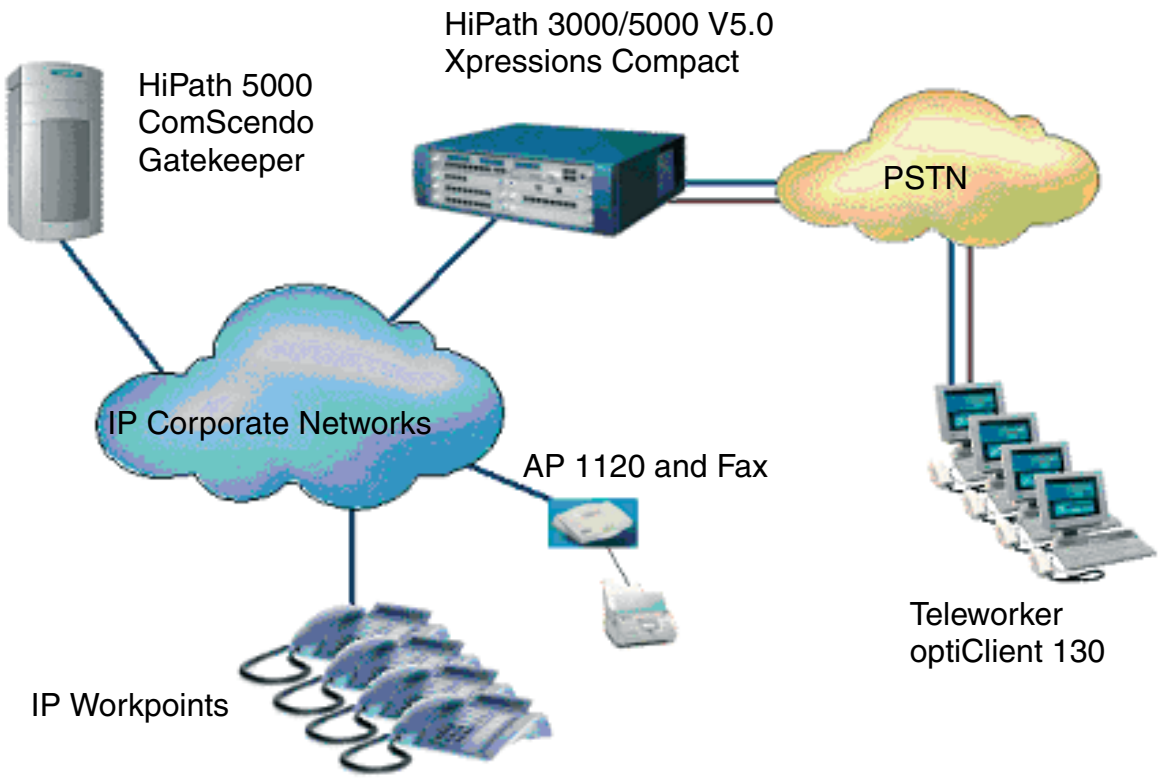
1.3.12.2 HiPath 3000 standalone (TDM and IP)



In this scenario, HiPath 3000 is implemented as a standalone system in the traditional and IP-based telephone infrastructure environment. The customer's existing IP network (corporate network) is used to exclude IP workpoints. Existing fax devices are connected to the IP network via HiPath AP 1120.

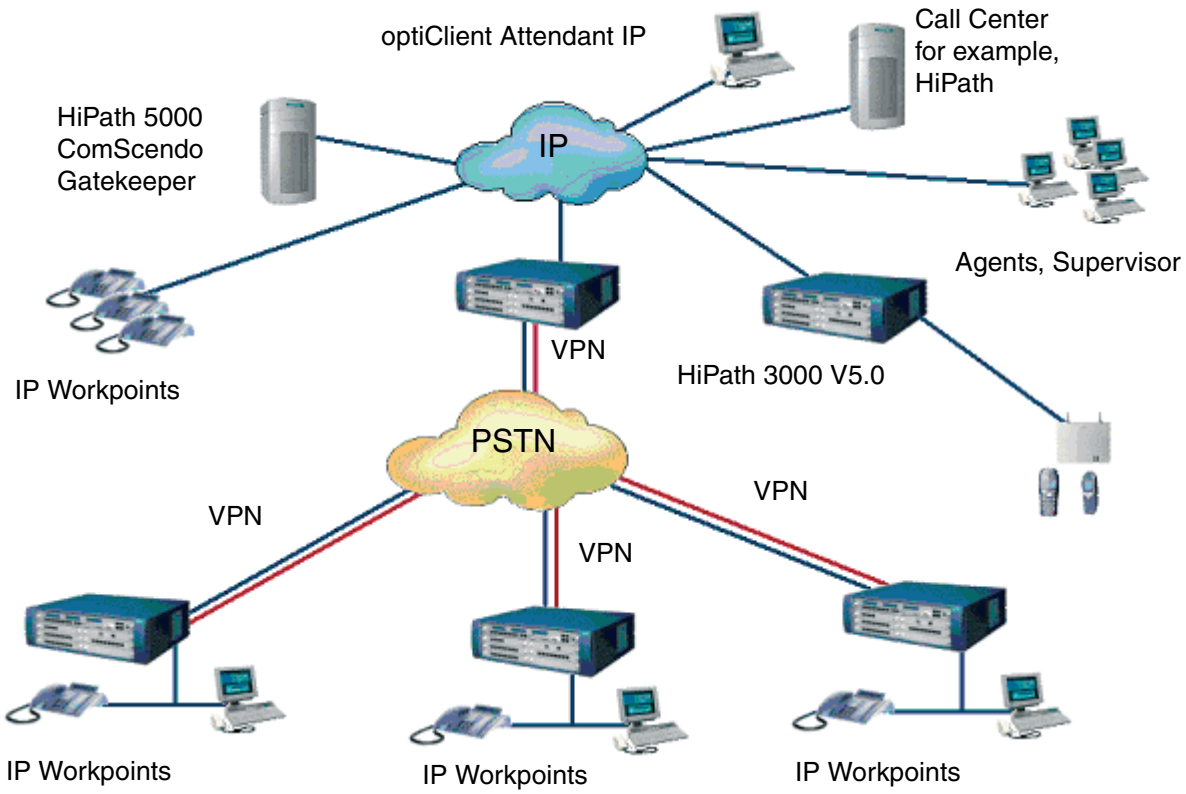
This scenario is suitable for customers who want to protect their existing investments in the traditional telephone infrastructure, but would like to migrate gradually to an IP-based environment.

1.3.12.3 HiPath 3000 Networked over IP with HiPath 5000

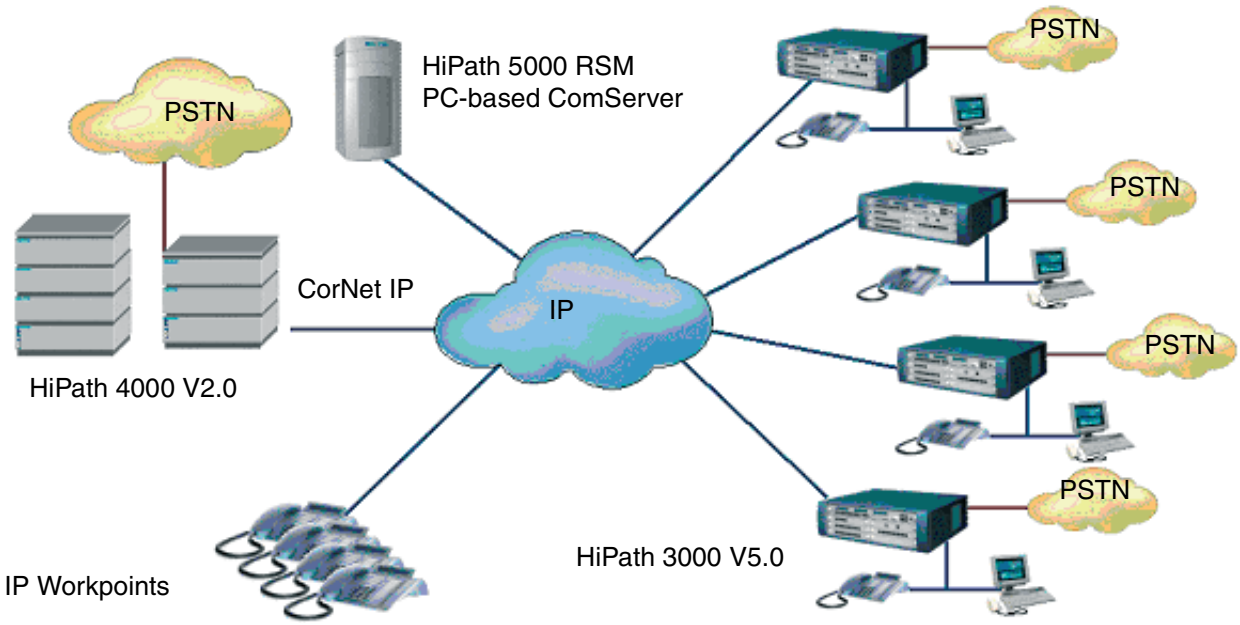


In this scenario, HiPath 3000 is used as a gateway to the carrier's traditional telephone infrastructure (PSTN). On the station side however, the IP-based telephone infrastructure is used. The scope of features is defined by HiPath ComScendo.

1.3.12.4 HiPath 3000 Networked over IP with HiPath 5000 (with VPN)



1.3.12.5 HiPath 3000 Networked over IP with HiPath 4000 and HiPath 5000



In this scenario HiPath 3000, HiPath 4000 and HiPath 5000 systems are networked with one another by means of the CorNet IP protocol (IP trunking). The scope of features is determined by this protocol because not all features can be transferred between the systems.

1.3.12.6 HiPath 3000 as a Branch on HiPath 4000 (Small Remote Site)

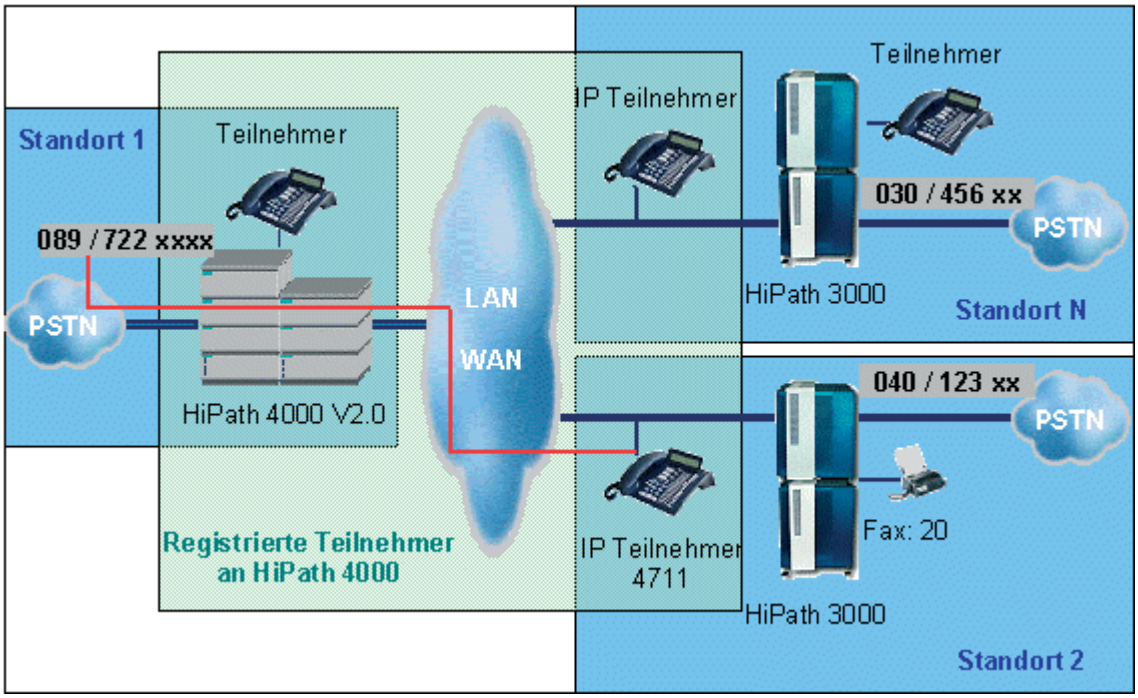


Figure 1-5 Small Remote Site: Normal State

This scenario is a special variant of the networking with HiPath 4000 systems. This configuration enhances the failure tolerance of the IP stations.

In the normal state, the IP stations in the branch locations (small remote site) are logged on and registered at the HiPath 4000 system.

Station 4711 at location 2 can be contacted using the number 089/722 4711 via the HiPath 4000 system at location 1.

Station 4711 at location 2 can be contacted using the number 040/123 10 via the HiPath 3000 system at location 2 (principle: call forwarding to station 4711 in HiPath 4000 on dialing the IP station 10 in HiPath 3000).

Fax station 20 can be contacted using the number 040/123 20 via the HiPath 3000 system at location 2.

Depending on HiPath 4000 administration, external outgoing calls from station 4711 are conducted either in HiPath 4000 or in the assigned HiPath 3000 gateway.

Boundary conditions for the small remote site:

With the exception of fax stations there must not be any TDM stations in the HiPath 3000 system on the station side.

The number of IP stations at the individual locations is defined by the limitations of the HiPath 4000 system and the IP infrastructure, in particular by the available bandwidths.

Bandwidth management performed by the HiPath 4000 resource manager for IP trunking and IP stations must be taken into account here.

This networking scenario is not approved for use at the moment in networks with only HiPath 3000/5000 systems.

HiPath 5000 RSM is not approved for use.

HiPath 5000 PCS is not approved for use.

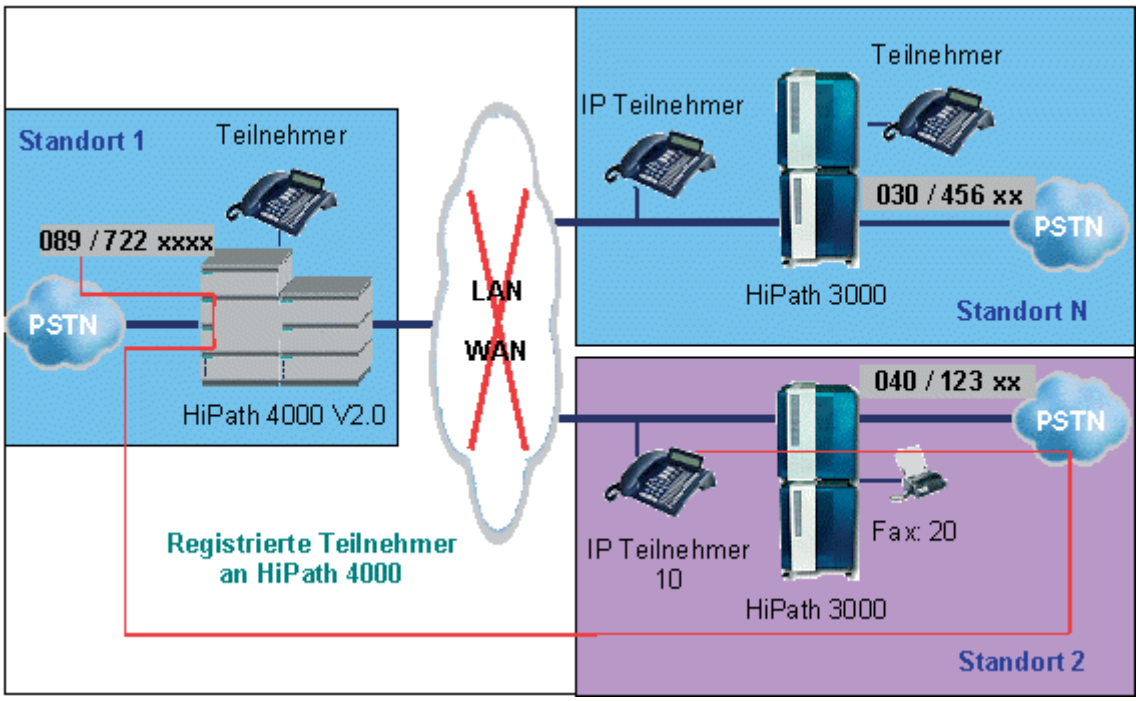


Figure 1-6 Small Remote Site: Failure of the IP network

In emergency mode (for example, failure of the IP network), the IP stations lose the connection to the HiPath 4000 gateway. The "Small Site Redundancy" function causes the call number and the gateway to be switched automatically.

Station 4711 at location 2 registers automatically on the HiPath 3000 system at location 2 and is assigned the extension number 10.

An external call to extension 10 in HiPath 3000 reaches extension 10 directly in this case.

An external call to extension 4711 over HiPath 4000 can be routed via trunks within HiPath 4000 to HiPath 3000.

1.3.13 IP Mobility

The mobility option integrates mobile terminals in the enterprise's communication processes and offers users the following basic functions:

- The One Number Service offers availability under a single call number regardless of location and irrespective of the mobile unit used.
- Mobile staff have access to their familiar telephone features and communication platform regardless of their location and the terminal used.

New features in HiPath 3000/5000 support teleworking and desk sharing concepts.

1.3.13.1 Teleworking

The Teleworking option is the solution for staff who have a permanent workplace off the company campus. The Teleworking option offers both the One Number Service, and access to HiPath telephony features on a fixed telephone in the home office. As well as any analog telephones, system telephones from the optiPoint or optiset E series can also be used at the home workplace.

1.3.13.2 Desk Sharing

The DeskSharing option is the hoteling solution and provides desks for employees whose jobs require them to change locations within the company campus. DeskSharing desks can be used by several employees, ensuring that the best possible use is made of the available desks. DeskSharing offers the following basic function:

Employees who do not have a fixed desk can reserve a desk and telephone for a specific period. This reservation is made by means of a Web user interface from any PC or by means of a check-in station in the foyer of a DeskSharing area. Employees can book themselves in at their temporarily reserved desk. Check-in takes place either at the check-in station in the foyer of a DeskSharing area or using the Check-In by Phone feature at any phone in the DeskSharing area. When employees check in, the properties and features of their home telephone are automatically transferred to the reserved station

1.4 Migration

1.4.1 HiPath 3000

HiPath 3000 V6.0 and future successor versions will offer new features, such as, "Extended Number of CDR Entries". These new features require additional memory which is provided by the new 64-MB MMC card. New control boards are essential to guarantee the function of the 64-MB MMC card.

The new control boards, including the 64-MB MMC card, will be included with the upgrade items for HiPath 3000 V6.0 (HiPath 3300, HiPath 3350, HiPath 3500, HiPath 3550, HiPath 3700, HiPath 3750). The control boards for HiPath 37x0/35x0 also feature the new Entry Voice Mail (EVM).

Provisions have not been made for a straightforward software update from an older version to V6.0. Updates of this kind are impossible.
The old control boards with 16-MB MMC card are now only supported to V4.0.

1.4.2 HiPath 33x0 and 35X0 with EVM

In version 5.0 or later the 33x0 and 35x0 systems are supplied with mainboards on which the entry voicemail module EVM has been plugged in. Xpressions Compact should be marketed for requirements above and beyond this.

Xpressions Compact only is marketed for existing customers.

With version V5.0, new S_{2m} boards requiring a license are provided for the 35x0 model. These require the marketing of B channel licenses and release over the license server. Existing customers can continue to use the existing S_{2m} boards that do not require a license by upgrading to version 5.0 (a license is not required for version V5.0). Mixed mode in a single system is possible.

1.4.3 HiPath 37x0

The hardware migration steps that apply to version 4.0 also apply to existing customers.

Systems with seven-slot hardware are supported by version V6.0. Upgrades are still only permitted for service purposes.

1.4.4 HG 1500

HG 1500 V2.0 hardware is no longer supported with V6.0. This has to be replaced with HG 1500 V3.0 hardware (HXGS3 or HXGM3).

1.4.5 Peripheral Boards

The following peripheral boards are no longer supported with V6.0

- SLA16 only in HiPath 37x0 systems
- TMS2M
- TMOM

1.4.6 optiClient 130

With version 6.0, the optiClient 130 S V2.0 has to be marketed as a new product.

1.4.7 optiPoint 400/410/600

A software update will be required for the upgrade.

1.4.8 optiClient Attendant

- optiClient Attendant V5.0 and earlier Attendant P systems:
  New product optiClient Attendant V7.0.
- optiClient Attendant V6.0:
  optiClient Attendant V7.0 upgrade item.

Compatibility of the optiClient Attendant with HiPath 3000:

	HiPath 3000/ 5000 V5.0	**HiPath 3000 V4.0**	**HiPath 3000 V3.0**	**HiPath 3000 V1.2**
optiClient Attendant V7.0	Yes	Yes	Yes	Yes
optiClient Attendant V6.0	No	Yes	Yes	Yes
optiClient Attendant V5.0	No	No	Yes	Yes

1.4.9 CMI

New BS4 base stations that require a license are supplied with version V5.0. These require the marketing of CMI licenses and release via the license server. Existing customers can continue to use the existing BS3 base stations that do not require a license by upgrading to version V5.0. BS3x base stations continue to be supported with version V5.0. Mixed mode in a single system is possible.

The base station BS4 operates at HiPath 3000 V5.0 or later with SLC16N, SLCN, and direct connection (not with SLC16).

Cordless telephones Gigaset 3000 Comfort and Micro, Gigaset 4000 Comfort and Micro are supported.

1.4.10 Licenses

The following HiPath 3000 licenses can be migrated via HiPath License Management to the V5.0 license structure:

- optiClient Attendant V6.0: Free upgrade to V7.0 (order item)
- HG 1500 (free upgrade)

  IP user licenses for workpoints in accordance with ComScendo license for IP workpoints
  B Channels
  IPSec
  LWCA (Light Weight Certification Authority)

1.4.11 Networking

With HiPath 4000:

When migrating from TDM-based networks, it is possible to set the CorNet N or CorNet NQ protocol. This makes mixed mode of Hicom 300/HiPath 4000 with HiPath 3000 V3.0/V4.0/V5.0 possible.

Only the CorNet IP protocol is used for IP interworking using HiPath 4000 V2.0. Each HiPath 3000 node has to be migrated to version V5.0.

With HiPath 3000 V3.0/V4.0:

The CorNet N protocol can be used in TDM-based networks. This makes mixed mode of HiPath 3000 V3.0/V4.0/V5.0 possible.

Only the CorNet IP protocol is used for IP interworking. Each node has to be migrated to version V5.0.

1.5 Sales-Oriented Documentation

- Store and ordering procedure for the following items:

  German and English at the Fürth delivery center (LZF)
  Fax: +49 911 654 4271
  Mail: lzf@znnbg.siemens.de
  Intranet: http://c4bs.spls.de/

  – Fürth delivery center (LZF)
    http://www.click4business-supplies.de

- Other languages and addresses
  see list of stores at the following intranet address:
  http://intranet.icn.siemens.de/vz_dc_2/lagerort.htm

Documentation	Languages
Data sheets Data sheets can be accessed on the Internet at: http://www.siemens.de/hipath (–> Downloads)	
HiPath 3000/5000 HiPath 3750/HiPath 3550/ HiPath 3700/HiPath 3500	Brazilian, German, English, Portuguese, Slovakian, Spanish
HiPath 3000/5000 HiPath 3350/HiPath 3250/ HiPath 3150/HiPath 3300	German, English, Portuguese, Spanish
optiClient Attendant	Danish, German, English, Portuguese, Swedish
HiPath cordless	German, English
HiPath optiClient 130	German, English
HiPath optiPoint 600 office	German, English
HiPath optiPoint 400 standard 4.0	German, English
HG 1500	German, English
optiPoint 500 phones	German, English, Spanish
HiPath 3000 Manager C	German, English
Brochures and promotional gifts Please contact ICN EN Product Promotion.	

1.6 Technical Documentation

You can select and download the following documents (HTML and PDF):

- User documentation
- Administrator documentation
- Service documentation
- Sales documentation

from the following website:

https://netinfo2.icn.siemens.de/edoku3/search_de.htm

1.7 Privacy and Data Security

Handling personal data

This telephone system uses and processes personal data (as in call detail recording, telephone displays and customer data records).

In Germany, the processing and use of such data is subject to various regulations, including those of the Federal Data Protection Law (Bundesdatenschutzgesetz, BDSG). Observe all applicable laws in other countries.

The objective of privacy legislation is to prevent infringements of an individual's right to privacy based on the use or misuse of personal data.

By protecting data against misuse during all stages of processing, privacy legislation also protects the material interests of the individual and of third parties.

Guidelines applicable to Siemens AG employees

Employees of Siemens AG are bound to safeguard trade secrets and personal data under the terms of the company's work rules.

It is imperative to observe the following rules to ensure that the statutory provisions relating to service (on-site or remote) are strictly followed. This safeguards the interests of the customer and offers added personal protection.

Guidelines governing the handling of data

A conscientious and responsible approach helps protect data and ensure privacy:

- Ensure that only authorized persons have access to customer data.
- Use the password features of the system with no exceptions. Never give passwords to an unauthorized person orally or in writing.
- Ensure that no unauthorized person can ever process (store, modify, transmit, disable or delete) or use customer data.
- Prevent unauthorized persons from gaining access to data media such as backup copies or log printouts. This applies to service calls as well as storage and transport.
- Ensure that data media that are no longer needed are completely destroyed and that documents are not stored or left in places which are accessible to the public.
- Work closely with your customer contact; this promotes trust and reduces your workload.

1.8 Feedback/Comments

To continually improve this system description, the editorial team welcomes your comments. We would particularly like to know your views on the following:

- Areas that require more detail. Areas that are too detailed.
- Areas that need more graphics to aid understanding.
- Areas that are difficult to understand.
- Issues you would like to include.

Outside of the U.S., please send your comments to:

Siemens AG
Fachredaktion
Com ESY HD 243
Hofmannstr. 51
D-81359 Munich GERMANY
Fax.: + 49 89 722 33959

Also include your address, telephone and fax number so we can contact you if necessary. In the U.S., please refer to the reader comment form at the back of this document for information on how to submit comments about this manual.

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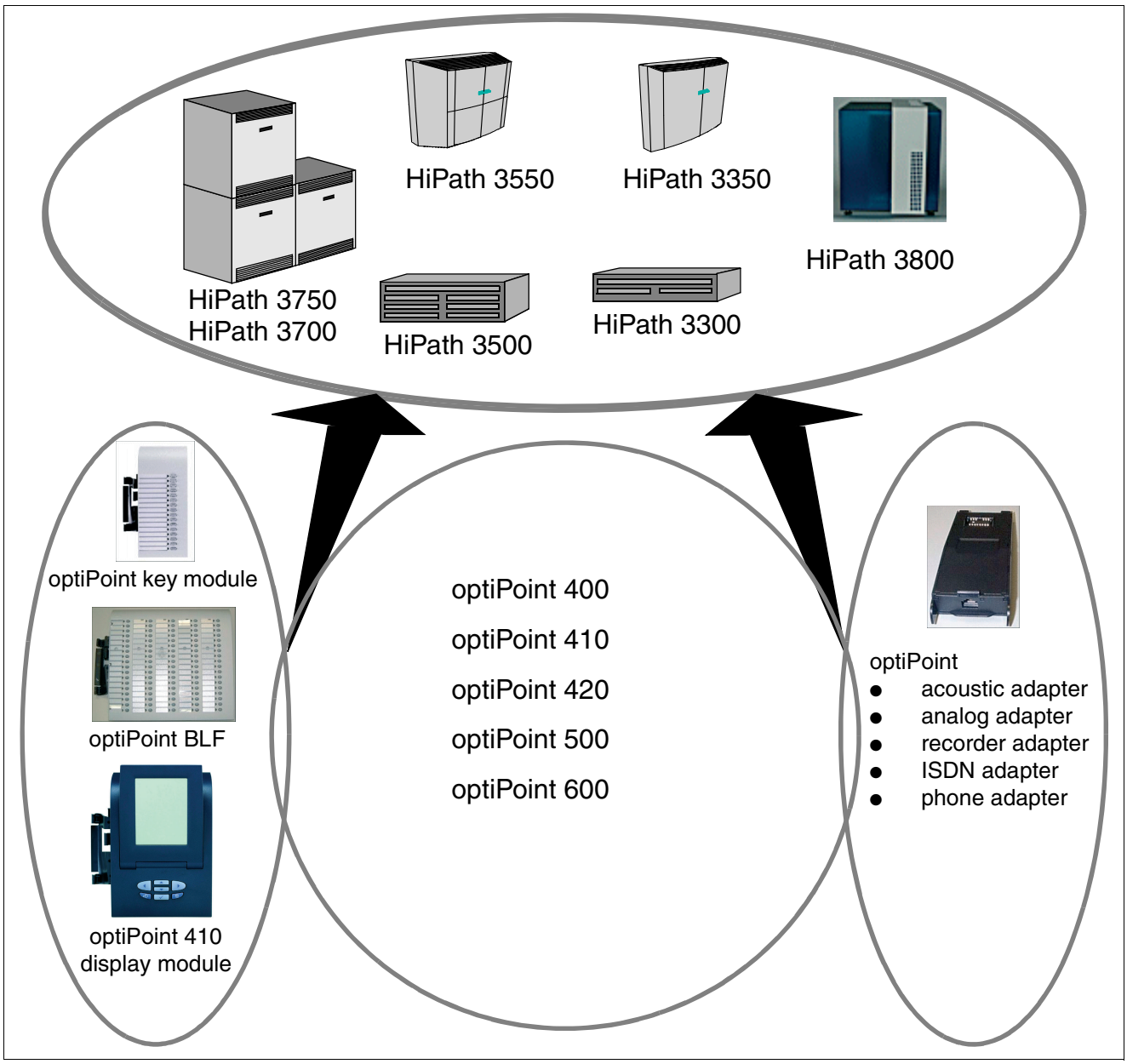
2 HiPath 3000 System Overview

Electrical environment

HiPath 3000 is intended for use in dwellings, businesses, and industry. When the system is operated in an industrial environment, additional measures may be necessary for ensuring immunity from electromagnetic radiation (refer to Section 2.18).



System families and accompanying models

The individual housing designs and the variable connecting capabilities allow the following HiPath 3000 systems to cover a wide customer range.

This system description contains information on all systems. Information on marketing individual models in different countries can be obtained at the responsible locations.

Starting with Version 3.0, all models in the HiPath 3000 system family (not HiPath 3250 and HiPath 3150) can be operated either as conventional telecommunications systems (TC systems) or as IP systems only. In this case, the IP stations connect directly via the HG 1500 boards.

- System for free-standing installation and installation in 19" cabinets:
  - HiPath 3800
- Systems for free-standing installation (HiPath 3750 only) and wall mounting
  - HiPath 3750
  - HiPath 3550
  - HiPath 3350
- Systems for installation in 19" cabinets
  - HiPath 3700
  - HiPath 3500
  - HiPath 3300

Refer to Table 2-1 for information on the capacity limits of the different HiPath 3000 systems.

2.1 System-Related Capacity Limits

The following assumptions are used as a basis for calculating the maximum capacity limits:

- HiPath 3800: two board slots are reserved for trunks.
- HiPath 3750, HiPath 3700: three board slots are reserved for trunks.
- HiPath 3550, HiPath 3500: two S_0 interfaces on the central board + one board slot are reserved for trunks.
- HiPath 3350, HiPath 3300: two S_0 interfaces on the central board are reserved for trunks.
- Traffic capacity: 0.15 erlangs

Deviating capacity limits can be determined for sales purposes. ^

Section 9.1 contains the system-specific maximum limits for $U_{P0/E}$ workpoint clients and the associated key modules and adapters.

Table 2-1 HiPath 3000/HiPath 5000 - System-Related Capacity Limits (Maximum Numbers)

System			HiPath 3800[1]	HiPath 3750 HiPath 3700	HiPath 3550	HiPath 3500	HiPath 3350	HiPath 3300	HiPath ComScendo Service
Stations/workpoint clients	**Total TDM + IP Stations[2]**		500	250/500[3]	192[4]	192[5]	96[6]	96[7]	–
	IP stations (system clients, H.323 clients)		500	250/500[3]	192[8]	192[8]	96[8 9]	96[8 10]	1000
	Total TDM stations[2]		384	250/384[3]	96[11]	77[11 12]	57[13]	41[14]	–
	TDM stations	Analog stations	384	250/384[15]	96[2]	44[16]	36[17]	20[18]	–
		$U_{P0/E}$ stations	384	250/384[3]	72[19]	48[20]	24[21]	24[22]	–
		Additional stations via adapter (phone adapter/analog adapter/ISDN adapter)	116	116[3 23]	48[11]	29[11]	24[24]	24[24]	–
		Cordless stations	250	250	64/32[25 26]	32	16	16	–
Base stations for HiPath Cordless Office			64	64	16/7	7	3	3	–
Trunks	**Total for all Trunks**		250	90/250[3]	60	60	16	16	–
	Total analog CO and network trunks		120	90/120[3]	60	60	16	8	–
	Total number of digital trunk B channels and digital network line B channels (S_0, S_{2M})		180	90/180[3]	60	60	16	16	–
	CorNet-IP network trunks		128	90/128[3]	60	60	16	16	250
HG 1500 boards			8	8	3	3	1 (2^{27})	1 (2^{28})	–
Gateway channels to the system			128	128	48	48	16	16	–

1 Testing is not required on stations and lines up to the maximum configuration. Configurations that contain UCD/ACD or more than one SLCN or groups with more than ten stations should always be checked with the help of the project planning tool (intranet: http://intranet.mch4.siemens.de/syseng/perfeng/tools/hpt/index.htm).
2 Only configurations that do not exceed these limits are supported.
3 Depending on system configuration and performance, the specified capacity limits may not always be reached. To ensure that the dynamic capacity limit of HiPath 3750 or HiPath 3700 is not exceeded, the configuration can be tested using the project planning tool (intranet: http://intranet.mch4.siemens.de/syseng/perfeng/tools/hpt/index.htm). Configurations with under 250 stations and 90 trunks do not have to be checked. Testing using the project planning tool is mandatory for configurations which include UCD/ACD, more than one SLC16/SLC16N, or groups of more than 10 stations.
4 Up to 96 of the 192 stations can be TDM stations.
5 Up to 61 of the 192 stations can be TDM stations (4xanalog T/R + 1x$U_{P0/E}$ + 7xBS/32xHiPath Cordless Office stations at the central board + 3xSLU8R or 3x8SLAR).
6 Up to 41 of the 96 stations can be TDM stations (4xanalog T/R + 5x$U_{P0/E}$ + 3xBS/16xHiPath Cordless Office stations at the central board + 1x16SLA).
7 Up to 33 of the 96 stations can be TDM stations (4xanalog T/R + 5x$U_{P0/E}$ + 3xBS/16xHiPath Cordless Office stations at the central board + 1xSLU8R or 1x8SLAR).
8 These are administrative capacity limits.
9 Due to the power consumption of HG 1500, a UPSC-D must be used.
10 Due to the power consumption of HG 1500, a UPSC-DR must be used.
11 An EPSU2 external power supply must be used if the total number of $U_{P0/E}$ stations, analog stations, and stations connected using adapters is greater than 72.
12 4xanalog T/R + 1x$U_{P0/E}$ + 7xBS/32xHiPath Cordless Office stations at the central board + 5xSLU8R or 5x8SLAR.
13 4xanalog T/R + 5x$U_{P0/E}$ + 3xBS/16xHiPath Cordless Office stations at the central board + 2x16SLA.
14 4xanalog T/R + 5x$U_{P0/E}$ + 3xBS/16xHiPath Cordless Office stations at the central board + 2xSLU8R or 2x8SLAR.
15 Configurations with under 384 analog stations, no other stations, and 90 trunks do not have to be checked with the project planning tool. Configurations that contain UCD/ACD or more than one SLC16/SLC16N or groups with more than ten stations should always be checked with the help of the project planning tool (intranet: http://intranet.mch4.siemens.de/syseng/perfeng/tools/hpt/index.htm).
16 4xanalog T/R at the central board + 5x8SLAR.
17 4xanalog T/R at the central board + 2x16SLA.
18 4xanalog T/R at the central board + 2x8SLAR.
19 8x$U_{P0/E}$ at the central board + 5xSLU8 + 1xSLMO24.
20 8x$U_{P0/E}$ at the central board + 5xSLU8R.
21 8x$U_{P0/E}$ at the central board + 2xSLU8.
22 8x$U_{P0/E}$ at the central board + 2xSLU8R.
23 The total number of $U_{P0/E}$ stations and stations connected using adapters is limited to 384.
24 A UPSC-D/UPSC-DR must be used if the total number of $U_{P0/E}$ stations and stations connected using adapters is greater than 24.
25 Due to the 5-V power supply unit, one SLC16/SLC16N and a maximum of two HG 1500 V3.0 boards can be used.
26 64 HiPath Cordless Office stations on SLC16/SLC16N or 32 HiPath Cordless Office stations on the central board.
27 The system may be configured with two HG 1500 boards if PDM1 is not used.
28 The system may be configured with two HG 1500 boards if PDM1 is not used.

2.2 HiPath 3800

2.2.1 Hardware Overview

HiPath 3800 is the new hardware platform and replaces the HiPath 3700 and HiPath 3750 models.
HiPath 3800 is supported from HiPath 3000 V5.0 onwards. It offers the full range of functions of Version 5.0 with all of the features and telephones.
HiPath 3800 systems can be fully integrated into HiPath 3000 V5.0/HiPath 5000 V5.0 networks and together with HP33x0/35x0/37x0 models can run to full capacity.

The HiPath 3800 system is a modular configuration. Depending requirements, it can be used as a:

- Single-cabinet system (basic cabinet BC)
- Two-cabinet system (BC + expansion cabinet EC)

There are 9 slots in the basic cabinet (BC) and 13 slots for peripheral boards in the expansion cabinet (EC). A fixed slot has CBSAP central control (slot 6, only in the BC).

If necessary, the LUNA2 power supply can be used up to three times in the basic cabinet (BC) and up to four times in the expansion cabinet (EC).

HiPath 3800 provides various connection options for connecting the peripheral board:

- SIVAPAC connectors on the backplane for connecting the external main distributor MDFU-E via cabling units (factory-made) or for connecting external patch panels.
- Connection panel with RJ45 jacks for direct peripheral board connection. The connection panels are connected to the SIVAPAC connector on the backplane.
- For U.S. only: Connection panel with CHAMP connector for direct peripheral board connection. The connection panels are connected to the SIVAPAC connector on the backplane.
- Connection panels with SIPAC 1 SU connectors for connecting the external MDFU-E main distributor or external patch panel via cabling units. The connection panels are connected to the SIVAPAC connector on the backplane.

HiPath 3800 is suitable for both free-standing installation as well as installation in 19" cabinets.

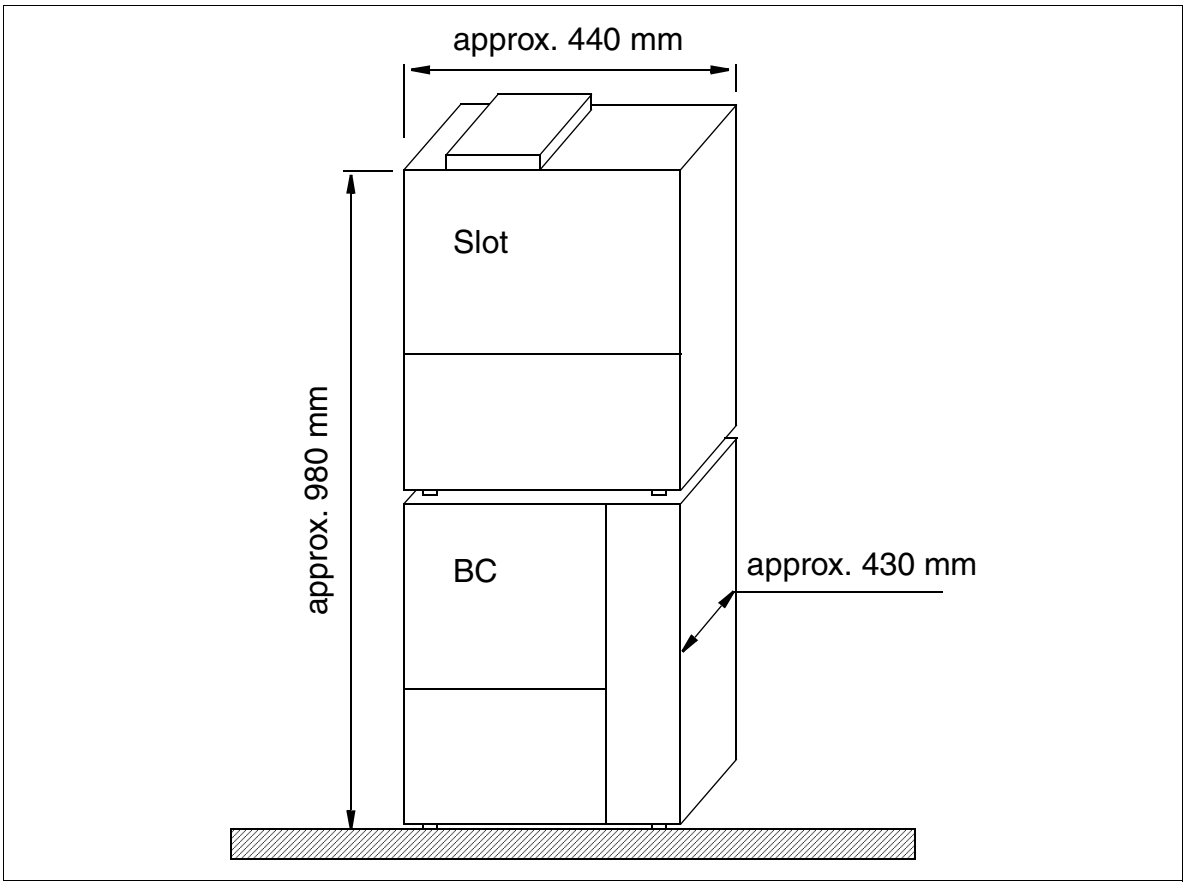


Figure 2-1 HiPath 3800 with Basic and Expansion Cabinet

2.2.1.1 Board Slots

There are 9 slots in the basic cabinet (BC) and 13 slots for peripheral boards in the expansion cabinet (EC).

A fixed slot has CBSAP central control (slot 6, only in the BC).

If necessary, the LUNA2 power supply can be used up to three times in the basic cabinet (BC) and up to four times in the expansion cabinet (EC).

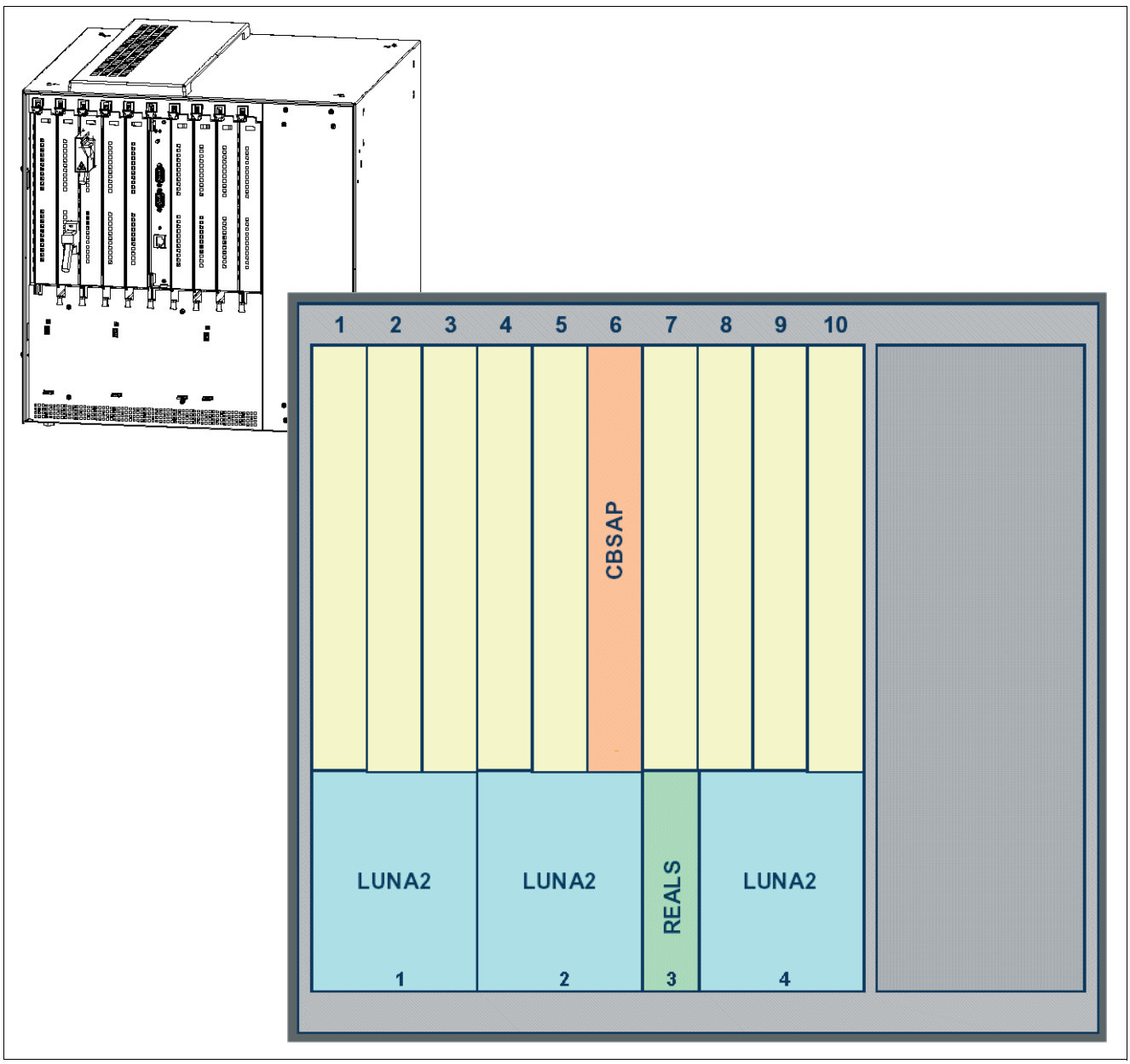


Figure 2-2 HiPath 3800 - Slots in the Basic Cabinet

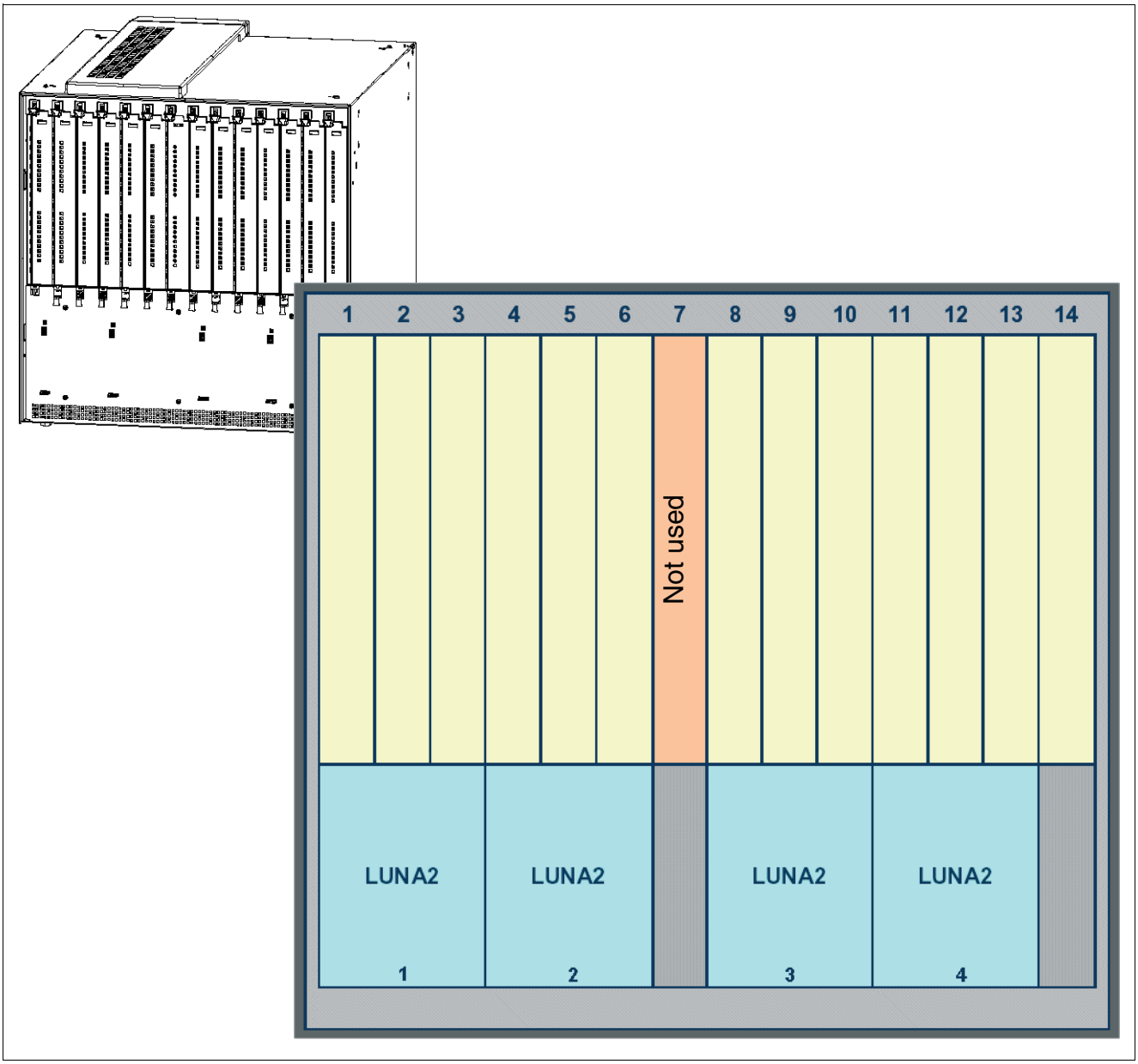


Figure 2-3 HiPath 3800 - Slots in the Expansion Cabinet

2.2.2 Distribution of PCM Segments

HiPath 3800 provides PCM highway trunk groups, each with 2 x 4 PCM highways for the peripheral board slots. There are approximately 32 time-division multiplex channels available for each PCM highway. Blockages occur when these channels are busy. This prevents the system from performing any more call jobs.

To guarantee that the system operates without blocking, make sure when performing configuration that the boards on a PCM segment do not require more than the number of time-division multiplex channels available. The following figures show the PCM highways for both system cabinets of the HiPath 3800.

Basic cabinet: PCM highways

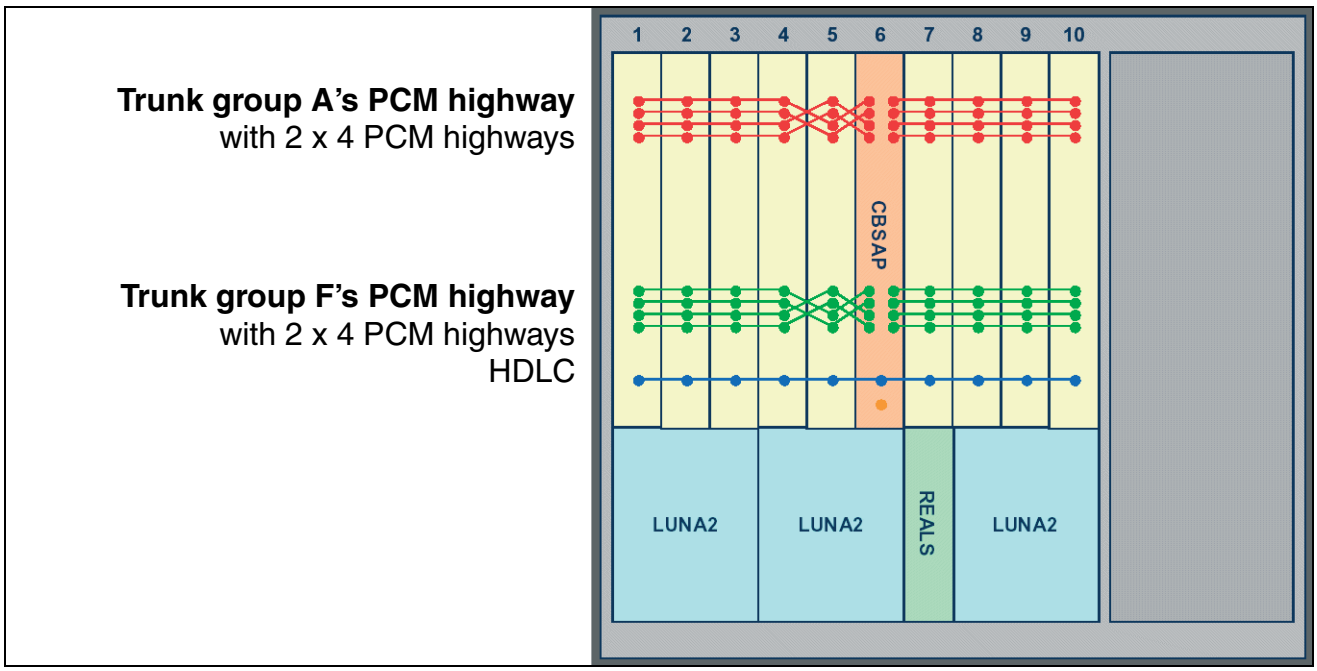


Figure 2-4 HiPath 3800 - Basic Cabinet PCM Highways

The basic cabinet provides two PCM highway trunk groups, each with 2 x 4 PCM highways. There are approximately 32 time-division multiplex channels available for each PCM highway.

The basic cabinet's PCM highway trunk groups are used by peripheral boards according to the following rules:

- **Single-cabinet system** (basic cabinet only)
  Apart from the DIUN2, DIU2U (U.S. only), and STMI2 boards, the peripheral boards only use the PCM highways of trunk group A:
  - PCM segment for the board slots 1 – 5 = 128 time-division multiplex channels (4 PCM highways)

– PCM segment for the board slots 7 – 10 = 128 time-division multiplex channels (4 PCM highways)

DIUN2, DIU2U (U.S. only), and STMI2 use the PCM highways of trunk group F. As a result, an additional 128 time-division multiplex channels for slots 1 – 5 and slots 7 – 10 are provided for these boards.
If the installation of these boards necessitates a greater number of time-division multiplex channels than the 2 x 128 available with trunk group F, the system automatically uses the time-division multiplex channels available with trunk group A. However, only complete boards are activated on the other trunk group. The remaining time-division multiplex channels remain free.

- **Two-cabinet system** (basic cabinet + expansion cabinet)
  All peripheral boards use only the PCM highways of trunk group A.

Expansion cabinet: PCM highways

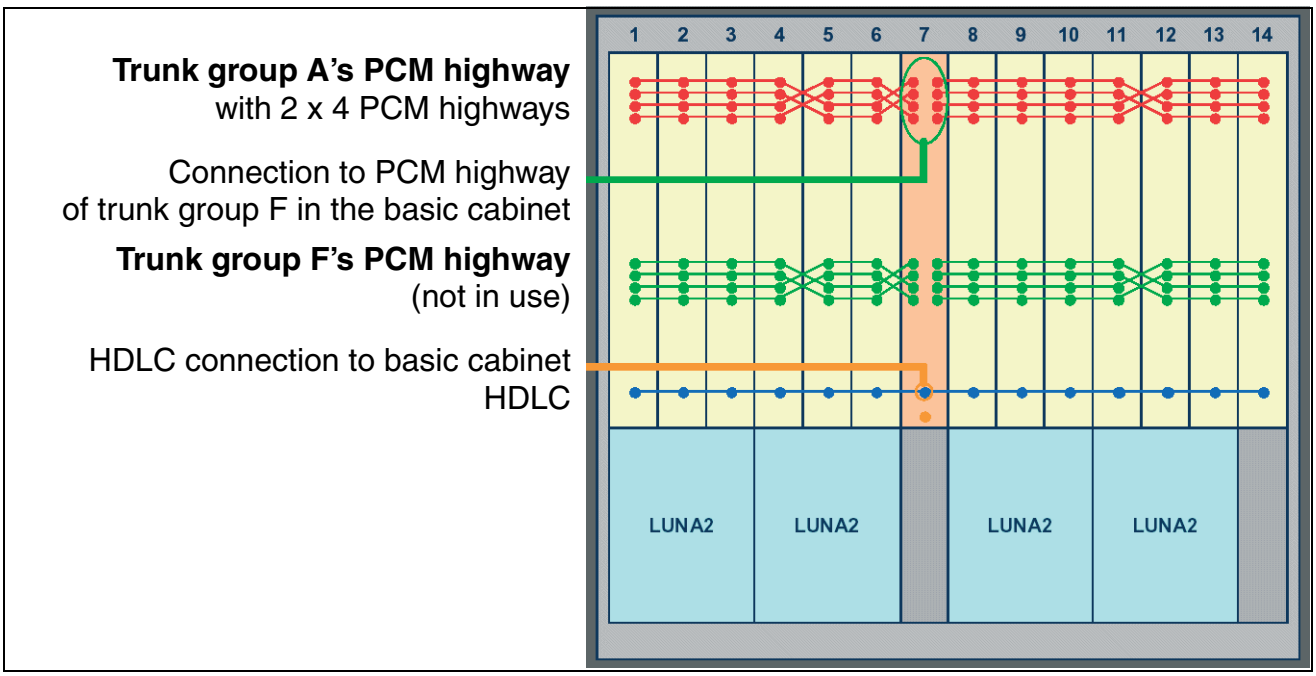

Trunk group A's PCM highway
with 2 x 4 PCM highways
Connection to PCM highway
of trunk group F in the basic cabinet
Trunk group F's PCM highway
(not in use)
HDLC connection to basic cabinet
HDLC
1 2 3 4 5 6 7 8 9 10 11 12 13 14
LUNA2
LUNA2
LUNA2
LUNA2

Figure 2-5 HiPath 3800 - Expansion Cabinet PCM Highways

The expansion cabinet provides a PCM highway trunk group with 2 x 4 PCM highways. There are approximately 32 time-division multiplex channels available for each PCM highway.

- PCM segment for the board slots 1 – 6 = 128 time-division multiplex channels (4 PCM highways)
- PCM segment for the board slots 8 – 14 = 128 time-division multiplex channels (4 PCM highways)

Trunk group F's PCM highway is not used.

Time-division multiplex channels for peripheral boards

The following table lists the maximum number of time-division multiplex channels required by the different peripheral boards. A distinction is made here between:

- static time-division multiplex channels
  Time-division multiplex channels are subject to static assignment in trunk boards. This ensures that all incoming calls can be processed.
- dynamic time-division multiplex channels
  Time-division multiplex channels are subject to dynamic assignment in subscriber line modules. Channels are seized for each call and released afterwards. This means the current number of time-division multiplex channels necessary depends on the number of active stations.

Restrictions for using the TMDID board
The TMDID board only uses the first half of a PCM segment. Consequently, a maximum of 64 channels is available on each PCM segment for TMDID-specific static time-division multiplex channels.
To guarantee that the system operates without blocking when using the TMDID, the boards on a PCM segment must not require more than the 64 static time-division multiplex channels.
Examples for a PCM segment:

- 2 x TMDID + 1 x DIU2U = 64 static time-division multiplex channels = approved equipment
- 1 x TMDID + 1 x TMC16 + 1 x DIU2U = 72 static time-division multiplex channels = unapproved equipment
- 1 x TMDID + 2 x SLMO2 = 8 static and 96 dynamic time-division multiplex channels = approved equipment

Tabelle 2-2 Maximum Number of Time-Division Multiplex Channels Required per Board

Board	Maximum Number of Time-Division Multiplex Channels Required	Time-Division Multiplex Channel Assignment
DIU2U	48	static
DIUN2	60	static
IVMN8	8	dynamic
IVMNL	24	dynamic
SLCN	128[1]	dynamic
SLMA	24	dynamic
SLMA8	8	dynamic

Tabelle 2-2 Maximum Number of Time-Division Multiplex Channels Required per Board

Board	Maximum Number of Time-Division Multiplex Channels Required	Time-Division Multiplex Channel Assignment
SLMO2	48[2]	dynamic
SLMO8	16[2]	dynamic
STMD3	16	static/dynamic[3]
STMI2	32	dynamic
STMI2 + PDMX[4]	64	dynamic
TM2LP	8	static
TMC16	16	static
TMDID	8	static
TMEW2	4	static

1 A time-division multiplex channel is required if a call is conducted via the "Home SLCN board" of a mobile telephone. If a call is conducted via a "Location-dependent SLCN board", additional time-division multiplex channels are necessary.
2 The maximum possible number of masters and slaves is taken into account.
3 Static time-division multiplex channel assignment for operation as a trunk board, dynamic assignment for operation as a subscriber line module.
4 PDMX is not currently released.

2.2.3 Static Traffic Capacity

The static traffic capacity of the HiPath 3800 system can be determined as follows.

Table 2-3 HiPath 3800 - Static Traffic Capacity

HiPath 3800	Slots per PCM segment	Static traffic capacity per PCM segment	Total static traffic capacity of the system
Single-cabinet system (see Page 2-9)	1 – 5	128 erlangs + (128 erlangs[1])	512 erlangs
	7 – 10	128 erlangs + (128 erlangs[1])	
Two-cabinet system (see Page 2-10)	1 – 5	128 erlangs	512 erlangs
	7 – 10	128 erlangs	
	11 – 16	128 erlangs	
	18 – 24	128 erlangs	

1 The basic cabinet provides two PCM highway trunk groups, each with 2 x 4 PCM highways. DIUN2, DIU2U (U.S. only), IVMNL, IVMN8 and STMI2 use the PCM highways of trunk group F. As a result, an additional 128 time-division multiplex channels for slots 1 – 5 and slots 7 – 10 in the basic cabinet are provided for these boards. If HiPath 3800 is used as a two-cabinet system, the PCM highway for trunk group F cannot be used.

2.2.4 Central Components

2.2.4.1 CBSAP

Introduction

The (**C**entral **B**oard **S**ynergy **A**ccess **P**latform) board performs all central control and switching functions for HiPath 3800.

Subboards

The following subboards can be used depending on the application:

- CMS clock module (optional)
- MMC multimedia card
- IMODN integrated modem card new (optional)
- LIMS LAN interface module (optional)
  Includes 2 Ethernet (10/100BaseT) LAN connections (8-pin RJ45 jacks):
  - LAN1 (administration via HiPath 3000 Manager E and CTI functions)
  - LAN2 (not assigned)
- MPPI music on hold (optional)

V.24 interfaces (9-pin SUB-D connectors)

- Service (X50) = for connecting the service PC
- Application (X51) = for connecting a printer or application

2.2.4.2 LUNA2

Introduction

LUNA2 (**L**ine-powered **U**nit for **N**etwork-based **A**rchitecture No. **2**) is used as the central power supply in HiPath 3800. Depending on the system configuration, up to three LUNA2 boards can be used in the basic cabinet and up to four in the expansion cabinet.

When configuring the HiPath 3800 as a two-cabinet system, two LUNA2 boards in the basic cabinet and three in the expansion cabinet are sufficient to provide the specified maximum configuration limits. For information on how to calculate the number of LUNA2 modules required, see Page 2-18.

You can use a third LUNA2 in the basic cabinet and a fourth in the expansion cabinet to

- ensure error-free operation if one LUNA2 module fails (redundant LUNA2).
- load a connected battery pack or battery cabinet.

LUNA2 combines power supply and battery management functions. No other components are required if it is operated as a power supply. To maintain short-term battery emergency operation after a power failure, that is, to use uninterruptible power supply functions, you must also connect a battery pack for each system cabinet or a BSG 48/38 battery cabinet (including battery charger).

LUNA2 is used in models for all countries.

Permitted batteries

S30122-K5950-Y200: Battery pack 4 x 12 V/7 Ah
This is the only battery pack approved for operation with LUNA2.

Part numbers

- LUNA2: S30122-K7686-L1, S30122-K7686-M1
  For production-related reasons, two different LUNA2 modules with the same functionality are used. Technically identical, the two models have minor mechanical differences and are fully compatible with each other.
- Battery pack 4 x 12 V/7 Ah: S30122-K5950-Y200
  (The connecting cable for the LUNA2 is integrated with the battery pack.)
- BSG upright battery housing 48/38: S30122-K5950-F300 (Page 2-17)
  - Battery cable for BSG 48/38: S39195-A7985-B10
    (One battery cable is required for each system cabinet to be connected.)
  - Battery 12 V/38 Ah: S30122-X5950-F320
    (Four batteries necessary for each BSG 48/38.)

Technical specifications

- Nominal voltage range: 110 Vac - 240 Vac
- Nominal frequency: 50 Hz - 60 Hz
- Output voltage (battery charging voltage, if a LUNA2 is used as a battery charger): –54.7 VDC; –53.5 VDC (for gell cell batteries, currently not released)
- Output current (battery charge current, if a LUNA2 is used as a battery charger): max. 2 A

- Bridging times
  The following table lists the maximum bridging times (battery operation in case of power failure) available with the battery pack S30122-K5950-Y200 (48 V/7 Ah) and battery housing BSG 48/38 (S30122-K5950-F300).

  Table 2-4 LUNA2 - Bridging Times with Battery Pack 48 V/7 Ah and Upright Battery Housing BSG 48/38

System	Power supply unit	Load levels	Maximum bridging time
HiPath 3800	2 x LUNA2 per system cabinet as PSU 1 x LUNA2 per system cabinet as battery charger 1 x battery pack 48 V/7 Ah per system cabinet	60% nominal load	25 min
HiPath 3800	5 x LUNA2 boards per system 1 x BSG upright battery housing 48/38 per system (LUNA2 is not required as a battery charger as the BSG 48/38 battery cabinet features a built-in charger.)	60% nominal load	1 h 30 min
Measurement conditions: • All measurements were performed at a room temperature of approximately 22 °C (71.6 °F). • The batteries were new and fully charged when measurement started.			

BSG 48/38

You can use a BSG 48/38 battery cabinet in an upright housing instead of the battery pack to extend the bridging time in the event of a power failure. The BSG 48/38 battery cabinet (S30122-K5950-F300) consists of

- an upright housing
- a charging rectifier
- a battery set (38 Ah/48 V)

The battery cabinet is designed for direct connection to the HiPath 3800 communication system.

Calculating the number of LUNA2 modules required

Depending on the number and type of peripheral boards installed, the number of LUNA2 boards required can be calculated using the following table.

Table 2-5 Determining the Number of LUNA2 Boards Required per Cabinet

	Number of peripheral boards per cabinet	STMI2, SLMA and/or SLCN available	Number of LUNA2s required per cabinet
Basic cabinet	< 5	No	**1**
	< 5	Yes	**2**
	≥ 5	No	**2**
	≥ 5	Yes	**2**
Expansion cabinet	< 5	No	**1**
	< 5	Yes	**2**
	≥ 5	No	**2**
	≥ 5	Yes	**3**
	≥ 10	No	**3**
	≥ 10	Yes	**3**

Examples for a single-cabinet system:

a) Basic cabinet with CBSAP and peripheral boards (no STMI2, SLMA or SLCN)

- A single LUNA2 can feed one CBSAP and up to four peripheral boards.
- A second LUNA2 is required for five or more peripheral boards.
- A third LUNA2 can be used as a battery charger or as a redundant LUNA2.

b) Basic cabinet with CBSAP and peripheral boards (with STMI2, SLMA and/or SLCN)

- Two LUNA2s are always required to supply a CBSAP, peripheral boards and STMI2, SLMA and/or SLCN.
- A third LUNA2 can be used as a battery charger or as a redundant LUNA2.

2.2.4.3 LIMS

The **L**AN **I**nterface **M**odule for **S**APP LIMS (S30807-Q6721-X) is an optional plug-in card for the CBSAP central control board in HiPath 3800.

The board provides two Ethernet (10/100BaseT) LAN connections via two 8-pin RJ45 jacks:

- LAN1 (administration via HiPath 3000 Manager E and CTI functions)
- LAN2 (not assigned)

The LIMS module can be used for administration via HiPath 3000 Manager E and for CTI functions (TAPI 120 V2.0). However, bear in mind that the number of BHCAs (Busy Hour Call Attempts = number of connection attempts during busy traffic hours) is restricted to 400 at a maximum of six TAPI ports. The use of "power dialers" is not approved.

You cannot operate the LIMS module and an STMI2 board simultaneously in a HiPath 3800.

2.2.5 Peripheral Components

2.2.5.1 Subscriber Line Modules

Table 2-6 Subscriber Line Modules for HiPath 3800

Board Name	Capacity				Country		Type/Description
	Ports per board	B channels per board	Boards per cabinet	Max. number of boards per system	ROW	U.S.	
IVMN8	8	8	1	1	x	x	These boards are for the integrated voicemail functions of HiPath Xpressions Compact.
IVMNL	24	24	1	1	x	x	
SLMA	24				x	x	Up to 24 analog telephones can be connected to the system via the SLMA. In addition to telephones, fax machines, modems, radio paging equipment, equipment for external music on hold, and voicemail systems can be connected. For Australia only: The T/R interfaces supply a ring voltage of 35 V_{eff}. Depending on the terminals connected, we cannot exclude the possibility of errors occurring during ringing state.
SLMA8	8				x	x	Board with eight analog interfaces For Australia only: The T/R interfaces supply a ring voltage of 35 V_{eff}. Depending on the terminals connected, we cannot exclude the possibility of errors occurring during ringing state.
SLCN	16	64	4	4	x		SLCN board for connecting base stations to the system.
SLMO2	24	48			x	x	Board for connecting optiPoint 500 and optiset E telephones. The SLMO board comes in 8- and 24-port versions.
SLMO8	8	16			x	x	

Table 2-6 Subscriber Line Modules for HiPath 3800

Board Name	Capacity				Country		Type/Description
	Ports per board	B channels per board	Boards per cabinet	Max. number of boards per system	ROW	U.S.	
STMD3	8	16	6	8	x	x	ISDN basic rate interface (BRI) board for configuring ISDN trunks, tie trunks, and subscribers on the same board. There are two versions of this board: • S_0 interfaces without power supply • S_0 interfaces with power supply
STMI2	2	32	4	8	x	x	HG 1500 board for the direct connection of IP work-point clients. Plugging in the PDMX module provides an additional 32 B channels (not currently released).

2.2.5.2 Trunk Boards

Table 2-7 Trunk Boards for HiPath 3800

Board Name	Capacity				Country		Type/Description
	Ports per board	B channels per board	Boards per cabinet	Max. number of boards per system	ROW	U.S.	
DIUN2	60	60		3	x	x	Basic rate interface (BRI) board; can also be used for tie trunk traffic. In HiPath 3000/HiPath 5000 V5.0 and later, the B channels in the DIUN2 board must be licensed.
DIU2U	48	48		4	-	x	ISDN interface board
STMD3	8	16			x	-	ISDN basic rate interface (BRI) board for configuring ISDN trunks, tie trunks, and subscribers on the same board. There are two versions of this board: • S_0 interfaces without power supply • S_0 interfaces with power supply
TMDID	8				-	x	Analog trunk board for direct inward dialing
TMC16	16				-	x	Analog trunk board (ground/loop start)
TM2LP	8				x	x	Board with eight ports for connecting MSI trunks, enabling CAS trunk connections

2.2.5.3 Boards for Tie Trunk Traffic

Table 2-8 Tie Trunk Traffic Boards for HiPath 3800

Board Name	Capacity				Country		Type/Description
	Ports per board	B channels per board	Boards per cabinet	Max. number of boards per system	ROW	U.S.	
DIUN2	60	60		3	x		Board for primary rate access. In HiPath 3000/HiPath 5000 V5.0 and later, the B channels in the DIUN2 board must be licensed.
TMEW2	4				x	x	Board for providing four two-way analog tie trunk circuits with E&M signaling.
STMD3	8	16			x	x	ISDN basic rate interface (BRI) board for configuring ISDN trunks, tie trunks, and subscribers on the same board. There are two versions of this board: • S_0 interfaces without power supply • S_0 interfaces with power supply
STMI2	2	32	4	8	x	x	HG 1500 board for connecting the HiPath 3800 system directly to a local IP network (Ethernet). Plugging in the PDMX module provides an additional 32 B channels (not currently released).

2.2.5.4 Options

Table 2-9 Optional Boards for HiPath 3800

Board Name	Capacity		Country		Type/Description
			ROW	U.S.	
TMEW2	Ports per board	4	x	x	In addition to its tie trunk circuit function, this board can also be used for connecting announcement equipment (with start/stop signaling for announcement before answering).
REALS	Relay connections	4	x	x	The REALS board is located on the basic cabinet's backplane. It can be used for relay switching (door opener) and trunk failure transfer (ALUM).
	Trunk failure transfers	1			
PFT1	Trunk failure transfers	1	x	-	PFT1 and PFT4 boards can be connected to the main distribution unit (MDFU-E). They transfer calls from analog trunks to a telephone in a power failure (note the signaling method used).
PFT4	Trunk failure transfers	4	x	-	
LIMS			x	x	Ethernet (10BaseT) interface

2.2.6 Additional System Data

Information not available.

2.2.6.1 Heat Dissipation and Power Consumption

Information not available.

2.2.6.2 Specifications for the Uninterruptible Power Supply LUNA2

Refer to Section 2.2.4.2 for details on LUNA2.

2.3 HiPath 3750

2.3.1 Hardware Overview

The HiPath 3750 system has a modular structure and can be extended by adding new boards or cabinets to accommodate growing customer requirements. An additional cabinet is referred to as an expansion cabinet. A HiPath 3750 system can have a maximum of three cabinets. The figure below shows a HiPath 3750 system with a basic cabinet, expansion cabinets, and a main distribution frame (MDFU-E).

The basic cabinet has 7 slots for peripheral boards. Expansion cabinets with 8 slots each for peripheral boards are implemented for expansions. As a result, when 2 expansion cabinets are implemented, a total of 23 slots are available for boards; with the exception of slot 08 in the basic cabinet, which has an installation width of 45 mm, all slots have an installation width of 30 mm.

Dimensions

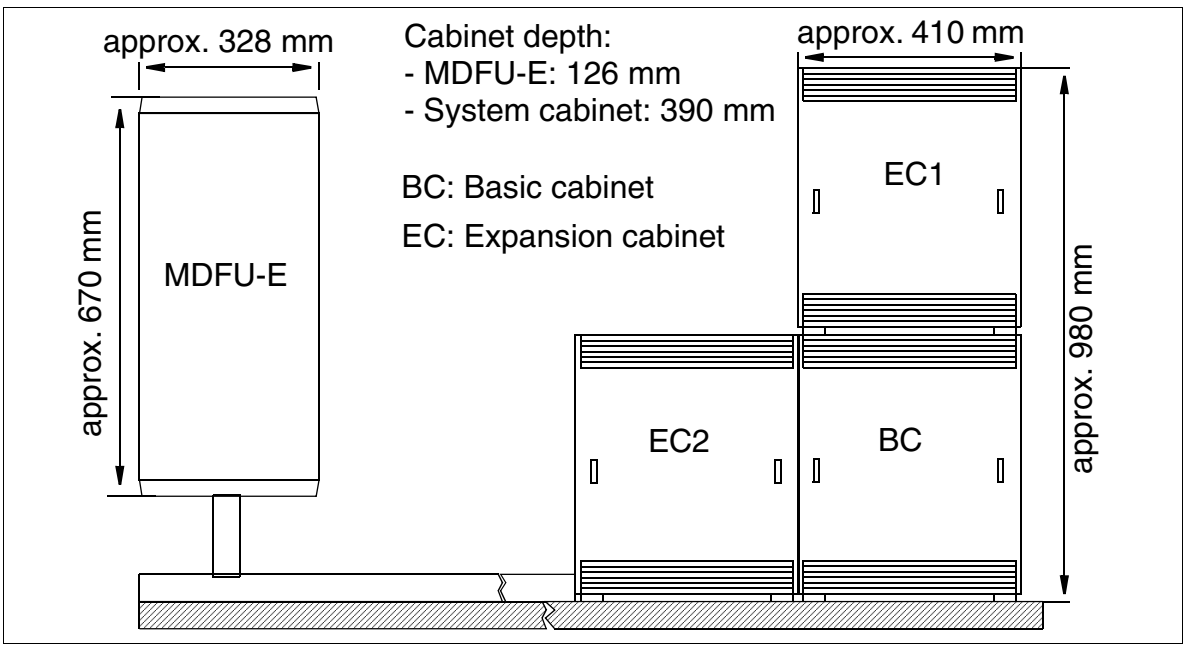


Figure 2-6 Dimensions of HiPath 3750 and the Main Distribution Frame (MDFU-E)

2.3.1.1 Board Slots

Nine board slots are available in each cabinet. The following boards are assigned permanent slots:

- CBCPR central control board -> slot 01 in the BC
- UPSM power supply unit -> slot 09 in the BC, slot 18 in EC1, slot 27 in EC2.

Depending on their width, peripheral boards can be inserted in slots 02 to 08 in the BC, 10 to 17 in EC1 and 19 to 26 in EC2 (the adhesive label beneath each slot identifies the slot).

Slots in Basic and Expansion Cabinets

Slot no.:									
BC:	CBCPR	02	03	04	05	06	07	08	UPSM
EC1:	10	11	12	13	14	15	16	17	UPSM
EC2:	19	20	21	22	23	24	25	26	UPSM
Width in mm:	45/30	30	30	30	30	30	30	45/30	90
	X10	X20	X30	X40	X50	X60	X70	X80	X90

Figure 2-7 Board Slots in “8-Slot” Basic and Expansion Cabinets

2.3.2 Distribution of PCM Segments

There are approximately 64 time-division multiplex channels available for each PCM segment. Blockages occur when these channels are busy. This prevents the system from performing any more call jobs.

To guarantee that the system operates without blocking, ensure during configuration that the boards on a PCM segment do not require more than the maximum 64 time-division multiplex channels. The following table lists the number of time-division multiplex channels that the different boards require.

Table 2-10 HiPath 3750 - Number of Time-Division Multiplex Channels Required per Board

Board	Number of time-division multiplex channels required
CR8N	8
HXGM3	16
IVML8	8
IVML24	24
SLA8N, SLA16N, SLA24N	Depends on the number of stations
SLC16, SLC16N	Depends on the number of mobile telephones logged on
SLMO8, SLMO24	Depends on the number of stations (hosts (master) **and** clients (slaves))
STMD8	16
TIEL	4
TMDID8	8
TML8W	8
TMOM	1
TMS2	30
TMST1	24

A tool is available at the following intranet address to illustrate PCM segments in HiPath 3750 systems:
https://netinfo4.wit.siemens.de/icnenho/vulcan_v10/product/vf_doku/tool

Caution
To guarantee that the system operates without faults or blocking, it is necessary that you observe the following rules for the configuration of boards:

- **SLC16, SLC16N**
  - A maximum of one SLC16 or SLC16N per PCM section. If possible, the SLC16 or SLC16N should remain alone on the PCM segment.
  - For more information on multi-SLCs, see Multi-SLC and Cross-System Networking.
- **IVML8, IVML24**
  - A maximum of one IVML8 or IVML24 per system.
  - This board may only be inserted into the slot beside the power supply in the basic cabinet or in the expansion cabinets.
  - You may not insert an SLC16 or SLC16N on the PCM segment of the IVML8 or IVML24.
  - You may not insert an SLMO24 on the PCM segment of the IVML24.
  - If there is a TMS2 on the PCM segment of the IVML24, only one board with up to eight ports is allowed on the free slot.
- **SLMO24**
  A maximum of two SLMO24s per PCM segment; the number of connected stations (hosts (master) **and** clients (slaves)) may not be more than 64.

The illustrations below show the PCM segments (64 time-division multiplex channels each) between the different HiPath 3750 system configurations.

Single-cabinet system: PCM segments

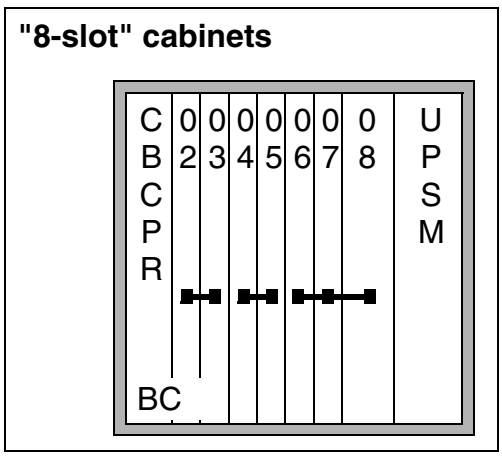


Figure 2-8 PCM Segments for a Single-Cabinet System

Two-cabinet system: PCM segments

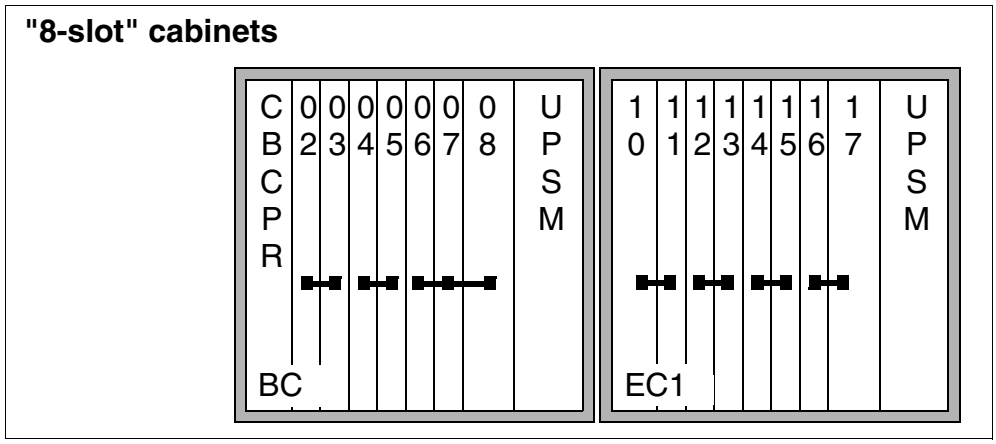


Figure 2-9 PCM Segments for a Two-Cabinet System

Three-cabinet system: PCM segments

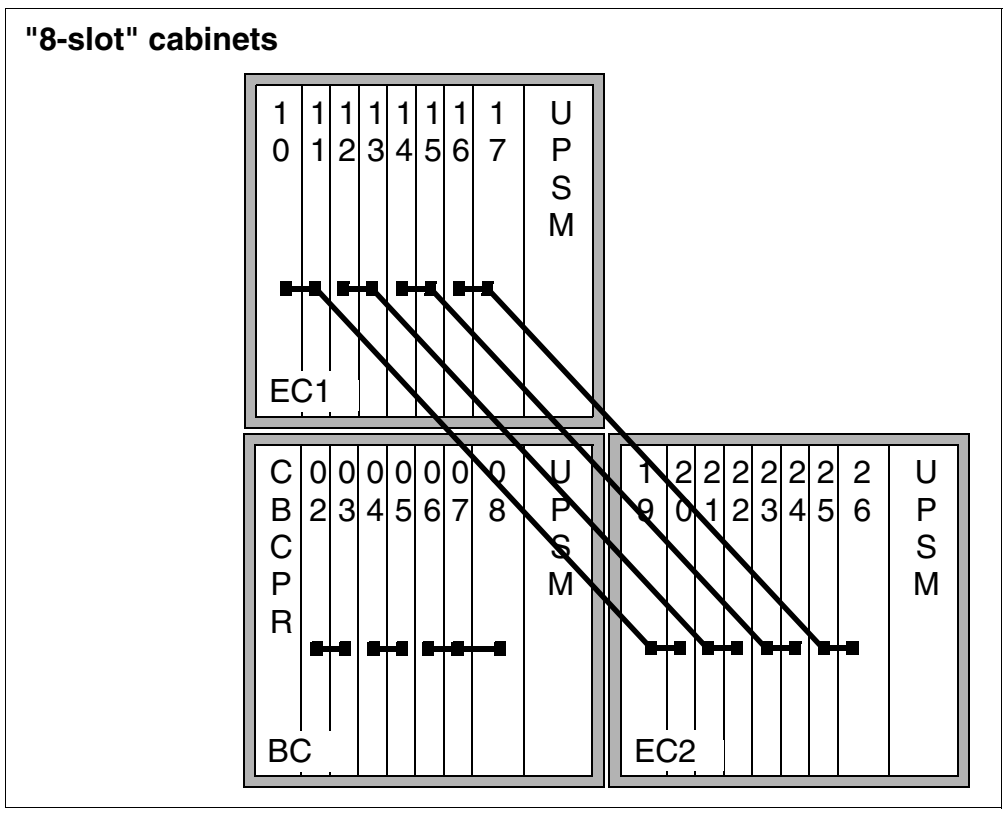


Figure 2-10 PCM Segments for a Three-Cabinet System

2.3.3 Static Traffic Capacity

The static traffic capacity of the HiPath 3750 can be determined as follows.

Table 2-11 HiPath 3750 - Static Traffic Capacity

HiPath 3750	Slots per PCM segment	Static traffic capacity per PCM segment	Total static traffic capacity of the system
Single-cabinet system (see Figure 2-8)	02 + 03	64 erlangs	192 erlangs
	04 + 05	64 erlangs	
	06 + 07 + 08	64 erlangs	
Two-cabinet system (see Figure 2-9)	02 + 03	64 erlangs	448 erlangs
	04 + 05	64 erlangs	
	06 + 07 + 08	64 erlangs	
	10 + 11	64 erlangs	
	12 + 13	64 erlangs	
	14 + 15	64 erlangs	
	16 + 17	64 erlangs	
Three-cabinet system (see Figure 2-10)	02 + 03	64 erlangs	448 erlangs
	04 + 05	64 erlangs	
	06 + 07 + 08	64 erlangs	
	10 + 11 + 19 + 20	64 erlangs	
	12 + 13 + 21 + 22	64 erlangs	
	14 + 15 + 23 + 24	64 erlangs	
	16 + 17 + 25 + 26	64 erlangs	

2.3.4 Central Components

2.3.4.1 CBCPR

Introduction

The CBCPR board performs all central control and switching functions for HiPath 3750.

Subboards

The following subboards (some of which are optional) can be used depending on the application:

- CMS clock module small
  - supports all 4, 8 and 12 channel CMI connections using the SLC16 board of the HiPath 3750, HiPath 3550 and HiPath 3700 systems.
  - provides the master clock for digital networking.

  Section 2.11 contains additional information on when CMS is used.
- MMC multimedia card
  This plug-in memory card contains the CDB backup and the version-specific APS. Please note that the MMC may only be replaced by a multimedia card approved by Siemens AG. Cards that have not been approved may have a different internal structure which can affect temporal access and certain features (for example, CDB backup and APS transfer).
- IMODN Integrated Modem Card New
  This plug-in card allows remote service (analog mode up to 33.6 Kbps), without having to use an external modem.
- LIM LAN interface module
  This subboard makes available an Ethernet (10BaseT/10 Mbps) LAN connection using an 8-pin RJ45 jack (see Section 2.3.4.3).
- MPPI (music on hold)

V.24 interfaces

- To connect a service PC, you can access the first V.24 interface (9-pin SUB-D plug) on the CBCPR from the front of the basic cabinet (after removing the cover).
- You can access the second V.24 interface (25-pin SUB-D plug) via the backplane of the basic cabinet (X7).

2.3.4.2 UPSM

Introduction

Each cabinet in HiPath 3750 requires one UPSM (**U**ninterruptible **P**ower **S**upply **M**odular). This board combines the power supply and battery management functions. No other components are required if operated as a power supply. To maintain short-term battery emergency operation after a power failure, that is, to use uninterruptible power supply functions, you must also connect a battery pack for each system cabinet or a BSG 48/38 battery cabinet (including battery charger) to the UPSM.

An LED lights up to indicate that the UPSM is in operation. The UPSM must be replaced when defective (LED does not light up).

All country-specific versions of the UPSM are used. The ring frequency of the modular ring generator can be parameterized to suit country-specific requirements.

Part numbers

- UPSM: S30122-K5950-S100, S30122-K5950-A100
- Battery pack 4 x 12 V / 7 Ah: S30122-K5950-Y200
  (The connecting cable for the UPSM is integrated with the battery pack.)

Technical specifications

- Nominal voltage range: 100 Vac - 240 Vac
- Nominal frequency: 50 Hz - 60 Hz
- Max. input current consumption: 5.4 A - 2.7 A
- Max. power consumption: approx. 430 W
- Output voltage (battery charging voltage): 42.5 - 55.2 VDC
- Output current (battery charge current): ≥ 0.8 A
  (sufficient for battery set rating) = 7 Ah)

- Bridging times
  The following table lists the maximum bridging times (battery operation in case of power failure) available with the battery pack S30122-K5950-Y200 (48 V/7 Ah).

  Table 2-12 UPSM - Bridging Times with Battery Pack S30122-K5950-Y200 (48 V/ 7 Ah)

System	Power supply unit	Load levels	Maximum bridging time
HiPath 3750	UPSM	100% nominal load	1 h
HiPath 3750	UPSM	60% nominal load	1h 40min
Measurement conditions: • All measurements were performed at a room temperature of approximately 22 °C (71.6 °F). • The cut-off voltage is 1.7 V per cell. • The batteries were new and fully charged when measurement started.			

  The battery recharging time is approx. 8.5 h.

Specifications of the modular ring generator

- Rated output voltages: 75 V_{act}
- Output frequencies: 20/25/50 Hz
- Output power
  - continuous: 4.0 VA
  - peak: 8.0 VA temporary (3 min. load/15 min. break)

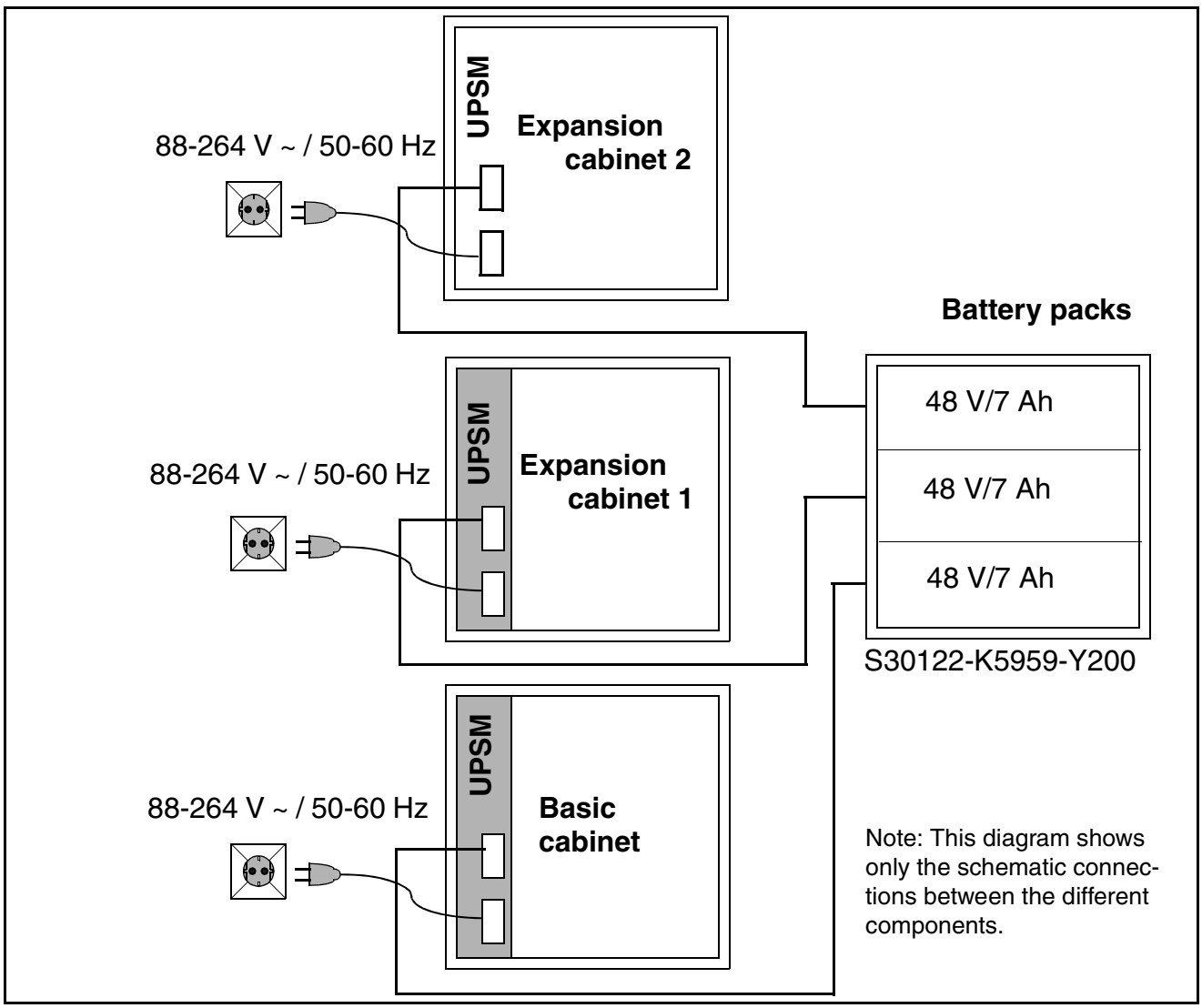
BSG 48/38

You can use a BSG 48/38 battery cabinet in an upright housing instead of the battery pack to extend the bridging time in the event of a power failure. The BSG 48/38 battery cabinet (S30122-K5950-F300) consists of

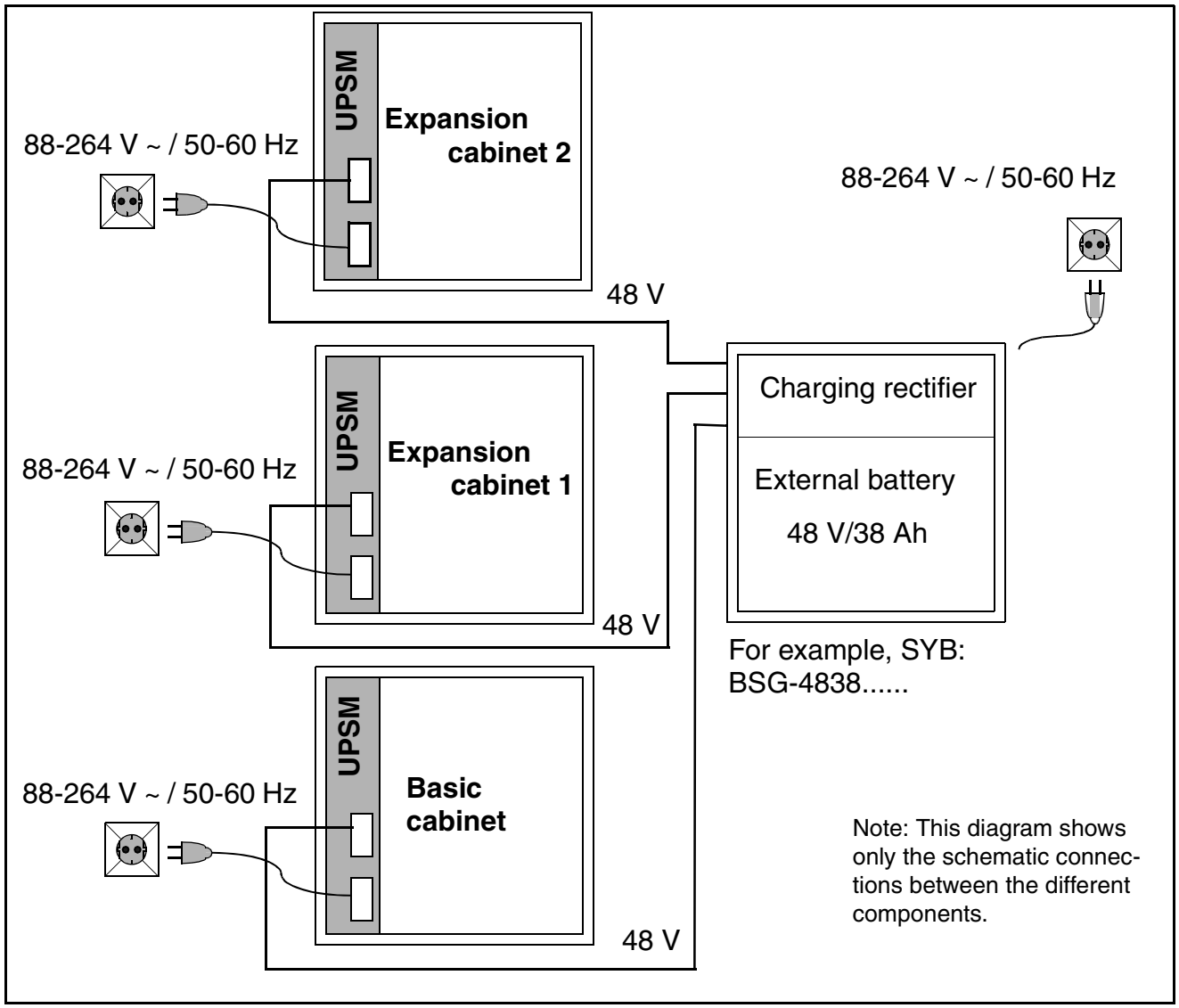
- an upright housing
- a charging rectifier
- a battery set (38 Ah/48 V)

The battery cabinet is designed for direct connection to the HiPath 3750 communication system.

UPSM and Battery Packs with no Ext. Charging Rectifiers



Connecting the UPSM with Battery Packs and Ext. Charging Rectifiers



2.3.4.3 LIM

The **L**AN **I**nterface **M**odule LIM (S30807-Q6930-X) is an optional subboard for all HiPath 3000 central control boards (see also Section 4.4).

The board provides an Ethernet (10BaseT/10 Mbps) LAN connection via an 8-pin RJ45 jack.

The LIM module can be used for administration via HiPath 3000 Manager E and for CTI functions (TAPI 120 V2.0). However, bear in mind that the number of BHCAs (Busy Hour Call Attempts = number of connection attempts during busy traffic hours) is restricted to 400 at a maximum of six TAPI ports. The use of "power dialers" is not approved.

You cannot operate the LIM module and a HG 1500 board simultaneously in one system.

2.3.5 Peripheral Components

2.3.5.1 Subscriber Line Modules

Table 2-13 Subscriber Line Modules for HiPath 3750

Board Name	Capacity				Country		Type/Description
	Ports per board	B channels per board	Boards per cabinet	Max. number of boards per system	ROW	U.S.	
HXGM3	2	16	4	8	x	x	HG 1500 board for the direct connection of IP workpoint clients.
IVML8	8	8	1	1	x	x	These boards are for the integrated voicemail functions of HiPath Xpressions Compact.
IVML24	24	24	1	1	x	x	
SLA8N	8		#[1]	#[1]	x	-	Board with eight analog interfaces
SLA16N	16		#[1]	#[1]	x	x	Board with 16 analog interfaces
SLA24N	24		#[1]	#[1]	x	x	Board with 24 analog interfaces
SLC16	16	64	4[2]	4	x	-	Boards for connecting up to 16 base stations to the system.
SLC16N	16	64	4[3]	4	x	-	
SLMO8	8	16	#[1]	#[1]	x	-	Board for connecting optiPoint 500 and optiset E telephones. The SLMO board comes in 8- and 24-port versions.
SLMO24	24	48	#[1]	#[1]	x	x	
STMD8	8	16	6	8	x	x	Board for ISDN basic access. Permits configuration of ISDN trunks, tie trunks, and subscribers on the same board.

1 The maximum number is calculated on the basis of the system-specific capacity limits in Table 2-1.
2 Exception: Basic cabinets can have up to two SLC16 boards.
3 Exception: Basic cabinets can have up to two SLC16N boards.

2.3.5.2 Trunk Boards

Table 2-14 Trunk Boards for HiPath 3750

Board Name	Capacity				Country		Type/Description
	Ports per board	B channels per board	Boards per cabinet	Max. number of boards per system	ROW	U.S.	
TML8W	8		#[1]	#[1]	x	-	Board with eight ports for connecting loop start trunks.
STMD8	8	16	#[1]	#[1]	x	x	Board for ISDN basic access. Permits mixed configuration of ISDN trunks, tie trunks, and subscribers on the same board.
TMS2	30	30	#[1]	6	x	-	Basic rate interface (BRI) board; can also be used for tie trunk traffic.
TMST1	24	24	#[1]	8	-	x	ISDN interface board
TMDID	8		#[1]	#[1]	-	x	Analog trunk board for direct inward dialing
TMGL8	8		#[1]	#[1]	-	x	Analog trunk board (ground/loop start)
TMAMF	8				x	-	Analog trunk board for direct inward dialing (MFC-R2)

1 The maximum number is calculated on the basis of the system-specific capacity limits in Table 2-1.

2.3.5.3 Boards for Tie Trunk Traffic

Table 2-15 Tie Trunk Traffic Boards for HiPath 3750

Board Name	Capacity				Country		Type/Description
	Ports per board	B channels per board	Boards per cabinet	Max. number of boards per system	ROW	U.S.	
TIEL	4		#[1]	#[1]	x	x	Board for providing four two-way analog tie trunk circuits with E&M signaling.
STMD8	8	16	#[1]	#[1]	x	x	Board for ISDN basic access. Permits configuration of ISDN trunks, tie trunks, and subscribers (no feeding) on the same board.
HXGM3	2	16	4	8	x	x	HG 1500 board for connecting the HiPath 3750 system directly to a local IP network (Ethernet).
TMS2	30	30	#[1]	6	x	-	Basic rate interface (BRI) board; can also be used for tie trunk traffic.

1 The maximum number is calculated on the basis of the system-specific capacity limits in Table 2-1.

2.3.5.4 Options

Table 2-16 Optional Boards for HiPath 3750

Board Name	Capacity		Country		Type/Description
			ROW	U.S.	
TIEL	Ports per board	4	x	x	In addition to its tie trunk circuit function, this board can also be used for connecting announcement equipment (with start/stop signaling for announcement before answering).
REAL	Relay connections	4	x	x	The REAL board is located on the basic cabinet's backplane. It is used for relay connection (such as a door opener) and power failure transfer (ALUM).
	Trunk failure transfers	1			
PFT1	Trunk failure transfers	1	x	-	PFT1 and PFT4 boards can be connected to the main distribution frame unit (MDFU/MDFU-E). They transfer calls from analog trunks to an analog telephone in a power failure (note the signaling method used). A maximum of two PFT1s or one PFT4 per MDFU/ MDFU-E can be used.
PFT4	Trunk failure transfers	4	x	-	
GEE8	Number of analog trunks supported	8	x	-	This board can be plugged into the TML8W analog trunk circuit board. It records call charge pulses from the trunk on a country-specific basis for up to eight trunks.
CR8N			x	x	The board has eight code transmitters and receivers.
LIM			x	x	Ethernet (10BaseT) interface

2.3.6 Additional System Data

2.3.6.1 Heat Dissipation and Power Consumption

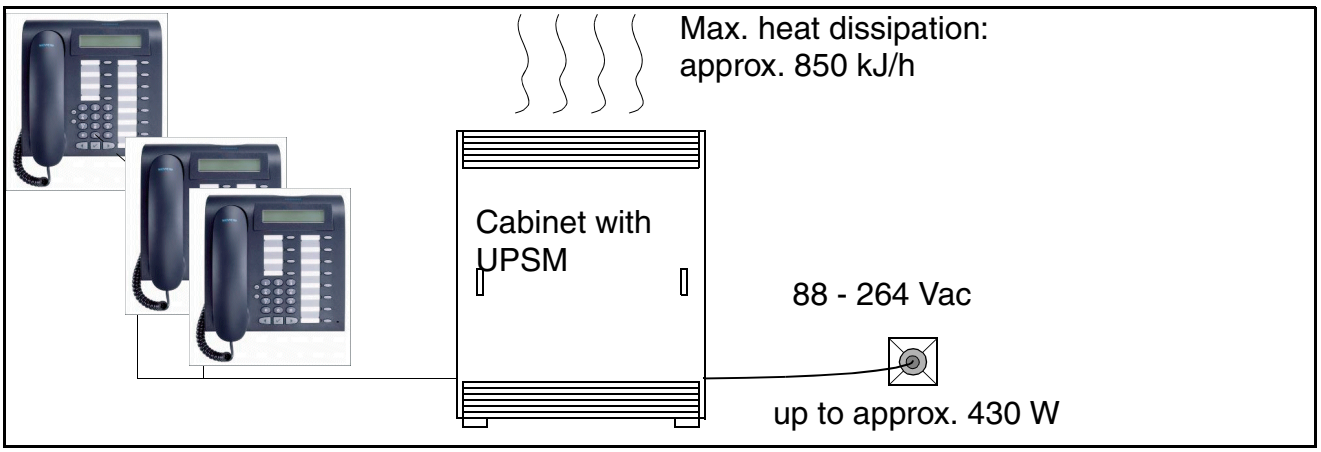


Figure 2-11 Heat Dissipation and Power Consumption in a HiPath 3750 Cabinet

Appendix A, “Identifying System Power Requirement” contains information on the power requirements of individual boards and components.

2.3.6.2 Specifications for the Uninterruptible Power Supply UPSM

Refer to Section 2.3.4.2 for details on the UPSM.

2.4 HiPath 3550

2.4.1 Hardware Overview

Structure

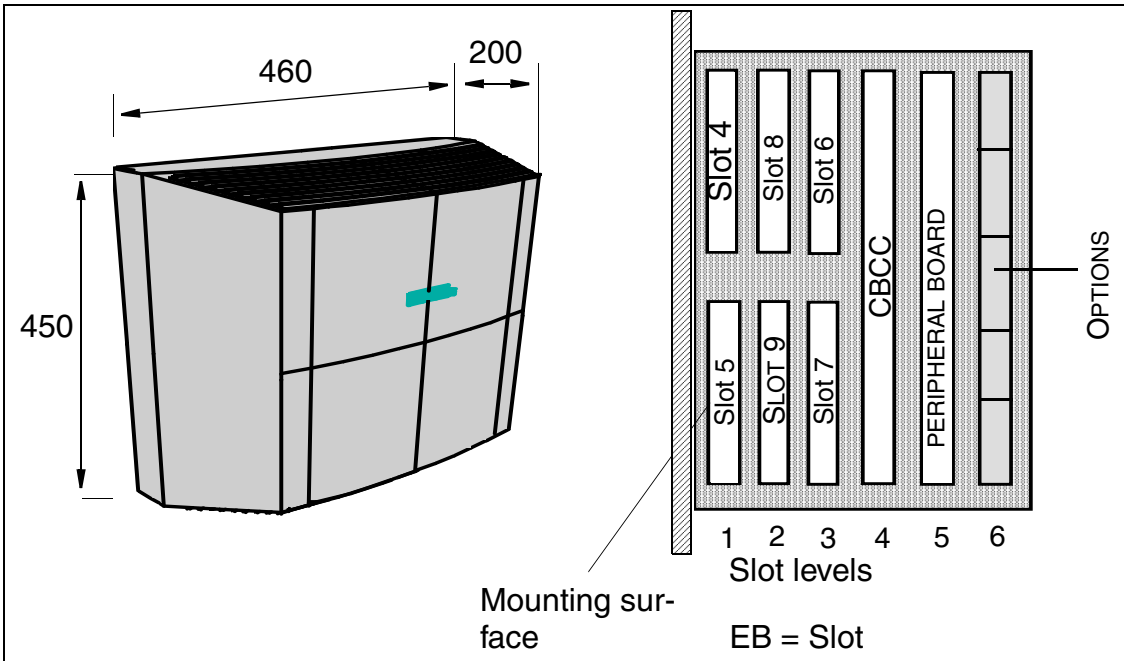
The HiPath 3550 housing intended for wall mounting contains one shelf with six slot levels. The slot levels, numbered in ascending order from the attachment side, have the following assignments:

- Slot levels 1-3: peripheral boards (two slots per level)
- Slot level 4: CBCC control board only
- Slot level 5: SIPAC slot (for HiPath 3750 boards)
- Slot level 6: optional boards (up to 5 modules)

The power supply unit is located on the back of the subrack.

The connecting cables to the peripherals (telephones, trunk connections) can be connected directly.

Dimensions and Slots



Notes:

- When mounting the system on the wall, plan for at least 30 cm of clearance on the board side for replacing the boards.
- TS2 and TST1 boards can be installed in slot 7 and slot 9 only.
- The following HiPath 3750-format boards can be installed on slot level 5: SLA8N, SLA16N, SLA24N, SLC16, SLC16N, SLMO24

Figure 2-12 Dimensions and Slots in HiPath 3550

2.4.2 Static Traffic Capacity

The HiPath 3550 system has the following static traffic capacities.

Table 2-17 HiPath 3550 - Static Traffic Capacity

System	Slots	Static Traffic Capacity	Total static traffic capacity of the system
HiPath 3550 (see Figure 2-12)	2 / 3 (CBCC)	24 erlangs	198 erlangs
	4	16 erlangs	
	5	16 erlangs	
	6	16 erlangs	
	7	16 erlangs	
	8	16 erlangs	
	9	30 erlangs[1]	
	10	64 erlangs	

1 Use of a TS2 board results in a capacity of 30 erlangs. A maximum of one TS2 per HiPath 3550 is possible, and the board may only be installed in slot 7 or 9, thus resulting in 30 erlangs for slot 7 or 9.

2.4.3 Central Components

2.4.3.1 CBCC

Introduction

The CBCC (**C**entral **B**oard with **C**oldfire **C**om) board performs all central control and switching functions for HiPath 3550.

Subboards

The following subboards (some of which are optional) can be used depending on the application:

- CMS clock module small
  - supports all two-channel cordless connections to the HiPath 3550, HiPath 3350, HiPath 3500 and HiPath 3300 systems.
  - supports all 4, 8 and 12 channel CMI connections using the SLC16 board of the HiPath 3750, HiPath 3550 and HiPath 3700 systems.
  - provides the master clock for digital networking.

  Section 2.11 contains additional information on when CMS is used.
- ADPCM (CMA) clock module
  - supports the 4-channel CMI connection over BS3/1 to the HiPath 3550, HiPath 3350, HiPath 3500 and HiPath 3300 systems.
  - in the same way as the CMS clock module small, provides the master clock for digital networking.

  Section 2.11 contains additional information on when CMA is used.
- MMC multimedia card
  This plug-in memory card contains the CDB backup and the version-specific APS. Please note that the MMC may only be replaced by a multimedia card approved by Siemens AG. Cards that have not been approved may have a different internal structure which can affect temporal access and certain features (for example, CDB backup and APS transfer).
- IMODN Integrated Modem Card New
  This plug-in card allows remote service (analog mode up to 33.6 Kbps), without having to use an external modem.
- LIM LAN interface module
  This subboard makes available an Ethernet (10BaseT/10 Mbps) LAN connection using an 8-pin RJ45 jack (see Section 2.4.3.3).

- MPPI (music on hold)

Interfaces

- Eight $U_{P0/E}$ (digital subscriber line interfaces)
  In HiPath 3000 V1.2 and later up to seven BS3/1 base stations can be connected directly for HiPath Cordless Office.
- Four T/Rs (analog subscriber line interfaces)
  For Australia only: The T/R interfaces supply a ring voltage of 35 V_{eff}. Depending on the terminals connected, we cannot exclude the possibility of errors occurring during ringing state.
- Two S_0 interfaces (trunk or subscriber or fixed connection)
- V.24 interfaces
  First V.24 interface on the CBCC; the second interface is implemented using the V24/1 option.

2.4.3.2 UPSC-D

Introduction

This board combines the power supply and battery management functions. No other components are required if operated as a power supply. To maintain short-term battery emergency operation after a power failure, that is, to use uninterruptible power supply functions, you must also connect a battery pack.

An EPSU2 external power supply must be used if the total number of $U_{P0/E}$ stations, analog stations, and stations connected using adapters is greater than 72.

Additional power can be made available by connecting the external EPSU2 power supply (see Section 2.4.6). For this, the EPSU2's DC connection needs to be connected to the special –48 Vdc input on the UPSC-D. The UPSC-D's internal -48-V output is deactivated when the external power supply is connected.

Technical specifications

- Nominal voltage range: 100 Vac - 240 Vac
- Nominal frequency: 50 Hz - 60 Hz
- Ring generator: 75 Vac, 20/25/50 Hz
- Partial voltages: +5 Vdc, –48 V
- Battery charger: 4 x 12 V (40.8 V-55.2 V)
- Power consumption: 180 W

- Bridging times
  The following table lists the maximum bridging times (battery operation in case of power failure) available with the battery pack S30122-K5928-X (48 V/1.2 Ah).

  Table 2-18 UPSC-D - Bridging Times with Battery Pack S30122-K5928-X (48 V/ 1.2 Ah)

System	Power supply unit	Load levels	Maximum bridging time
HiPath 3550	UPSC-D	Normal output load 100 % = 5 V/8 A; –48 V/1.1 A; ringing approx. 4 VA	6 min
HiPath 3550	UPSC-D	Normal output load 60 % = 5 V/4.8 A; –48 V/0.66 A; ringing approx. 2 VA	15 min
HiPath 3550	UPSC-D with EPSU2	Normal output load 100 % = 5 V/8 A; –48 V/2.5 A (external via EPSU2); ringing approx. 4 VA	17 min
Measurement conditions: • All measurements were performed at a room temperature of approximately 23 °C (73.4°F). • The batteries were fully charged when the measurement was started.			

2.4.3.3 LIM

The **L**AN **I**nterface **M**odule (LIM - S30807-Q6930-X) is an optional plug-in card for all HiPath 3000 central control boards (see also Section 4.4).

The board provides an Ethernet (10BaseT/10 Mbps) LAN connection via an 8-pin RJ45 jack.

The LIM module can be used for administration via HiPath 3000 Manager E and for CTI functions (TAPI 120 V2.0). However, bear in mind that the number of BHCAs (Busy Hour Call Attempts = number of connection attempts during busy traffic hours) is restricted to 400 at a maximum of six TAPI ports. The use of "power dialers" is not approved.

You cannot operate the LIM module and a HG 1500 board simultaneously in one system.

2.4.4 Peripheral Components

2.4.4.1 Subscriber Line Modules

Table 2-19 Subscriber Line Modules for HiPath 3550

Board Name	Capacity			Country		Type/Description
	Ports per board	B channels per board	Max. number of boards per system	ROW	U.S.	
4SLA	4		#[1]	x	-	Board for connecting analog stations (a/b, T/R)
8SLA	8		#[1]	x	x	Board for connecting analog stations (a/b, T/R)
16SLA	16		#[1]	x	-	Board for connecting analog stations (a/b, T/R)
HXGS3	2	8	3	x	x	HG 1500 board for the direct connection of IP workpoint clients.
IVMS8	8	8	1	x	x	Board for the integrated voicemail functions of HiPath Xpressions Compact.
SLU8	8	16	#[1]	x	x	Board for connecting optiPoint 500 and optiset E telephones ($U_{P0/E}$)
STLS2	2	4	#[1]	x	-	Board for providing ISDN basic rate access. Configuration of ISDN trunks, tie trunks, and subscribers (no feeding) on the same board is possible.
STLS4	4	8	#[1]	x	x	
SLA8N	8		1	x	-	HiPath 3750 board for connecting eight analog stations (a/b, T/R) Can be installed in Slot level 5 only
SLA16N	16		1	x	x	HiPath 3750 board for connecting 16 analog stations (a/b, T/R) Can be installed in Slot level 5 only
SLA24N	24		1	x	x	HiPath 3750 board for connecting 24 analog stations (a/b, T/R) Can be installed in Slot level 5 only
SLC16	16		1	x	-	HiPath 3750 boards for connecting 16 CMI base stations. Can be installed in Slot level 5 only
SLC16N	16		1	x	-	

Table 2-19 Subscriber Line Modules for HiPath 3550

Board Name	Capacity			Country		Type/Description
	Ports per board	B channels per board	Max. number of boards per system	ROW	U.S.	
SLMO24	24		1	x	x	HiPath 3750 board for connecting 24 optiPoint 500 and optiset E telephones ($U_{P0/E}$) Can be installed in Slot level 5 only

1 The maximum number is calculated on the basis of the system-specific capacity limits in Table 2-1.

2.4.4.2 Trunk Boards

Table 2-20 Trunk Boards for HiPath 3550

Board Name	Capacity			Country		Type/Description
	Ports per board	B channels per board	Max. number of boards per system	ROW	U.S.	
TLA	2		#[1]	x	-	Trunk board for analog lines
TLA4	4		#[1]	x	-	Trunk board for analog lines
TLA8	8		#[1]	x	-	Trunk board for analog lines

Table 2-20 Trunk Boards for HiPath 3550

Board Name	Capacity			Country		Type/Description
	Ports per board	B channels per board	Max. number of boards per system	ROW	U.S.	
TS2	30	30	1	x	-	Board for primary rate access; can be used for tie trunk traffic. In HiPath 3000/HiPath 5000 V5.0 and later, the B channels in the TS2 board are subject to license. Consequently, the TS2 boards (S30810-Q2913-X300) have been assigned a new hardware identification code. The new code prevents the board from being used in earlier versions. Functionality and layout of the board have not been changed.
STLS2	2	4	#[1]	x	-	Board for ISDN basic rate access. Configuration of ISDN trunks, tie trunks, and stations (no feeding) on the same board is possible.
STLS4	4	8	#[1]	x	x	
TST1	1	24	1	-	x	PRI board
TMGL4	4		#[1]	-	x	Trunk board for analog lines
TMQ4	4	8	#[1]	-	x	BRI board
TMAMF	8			x	-	Analog trunk board for direct inward dialing (MFC-R2)

1 The maximum number is calculated on the basis of the system-specific capacity limits in Table 2-1.

2.4.4.3 Boards for Tie Trunk Traffic

Table 2-21 Tie Trunk Traffic Boards for HiPath 3550

Board Name	Capacity			Country		Type/Description
	Ports per board	B channels per board	Max. number of boards per system	ROW	U.S.	
HXGS3	2	8	3	x	x	HG 1500 board for connecting the HiPath 3550 system directly to a local data network (Ethernet).
STLS2	2	4	#[1]	x	-	Board for ISDN basic rate access. Configuration of ISDN trunks, tie trunks, and stations (no feeding) on the same board is possible.
STLS4	4	8	#[1]	x	x	
TS2	30	30	1	x	-	Board for primary rate access; can be used for tie trunk traffic. In HiPath 3000/HiPath 5000 V5.0 and later, the B channels in the TS2 board are subject to license. Consequently, the TS2 boards (S30810-Q2913-X300) have been assigned a new hardware identification code. The new code prevents the board from being used in earlier versions. Functionality and layout of the board have not been changed.

1 The maximum number is calculated on the basis of the system-specific capacity limits in Table 2-1.

2.4.4.4 Options

Table 2-22 Optional Boards for HiPath 3550

Board Name	Capacity		Country		Type/Description
			ROW	U.S.	
ALUM4	Trunk failure transfers	4	x	x	Trunk failure transfer lets you transfer loop start trunks directly to internal analog stations in the event of a power failure (note the signaling method used).
ANI4	Analog trunks	4	-	x	This board allows calling line identification (caller ID) in conjunction with TMGL4.
GEE12	Number of call charge receivers	4	x	-	This optional board records the country-specific call charge pulses (12 kHz) from the trunk.
GEE16	Number of call charge receivers	4	x	-	This optional board records the country-specific call charge pulses (16 kHz) from the trunk.
GEE50	Number of call charge receivers	4	x	-	This optional board records the country-specific call charge pulses (50 Hz) from the trunk.
V24/1		1	x	x	One serial V.24 interface for connecting a PC, printer, or Plus Products.
STBG4			x	-	Current-limiting module for LS interface (France only)
EXM		1	x	-	External music on hold
EXMNA	Ports	1	-	x	External music on hold (A-LAW)
MPPI			x	-	Music on hold (MOH)
UAM			x	-	Announcement before answering/music on hold/relay/sensor
STRB	Sensors	4	x	x	Control relay module; provides 4 relays and 4 sensors for controlling external devices or detecting external control events.
	Relays	4			

2.4.5 Additional System Data

2.4.5.1 Heat Dissipation and Power Consumption

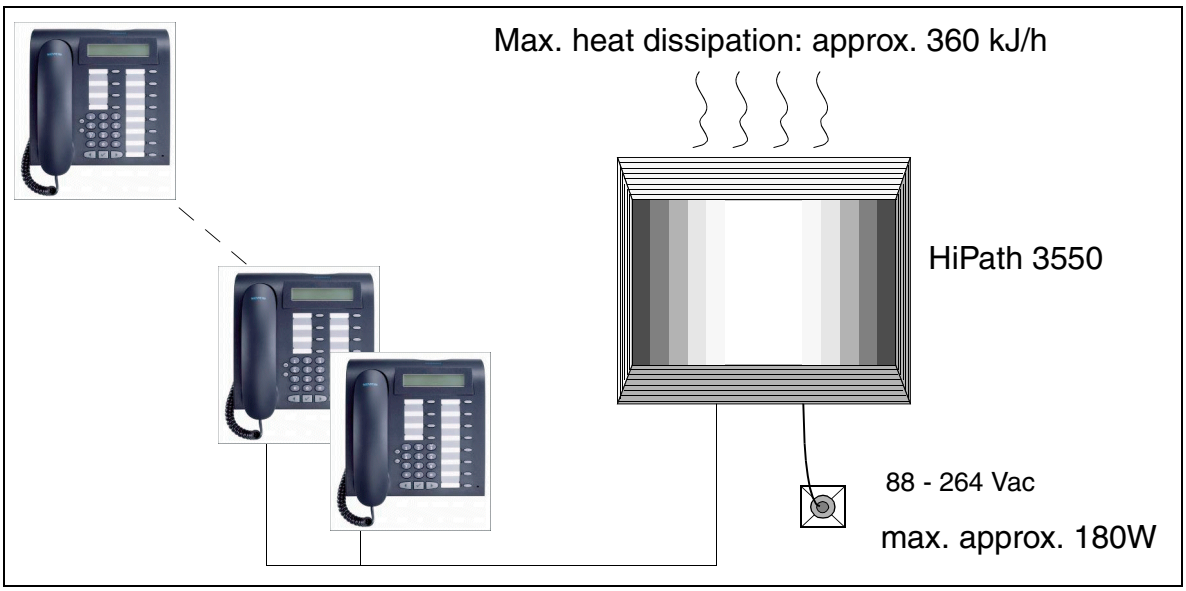


Figure 2-13 Heat Dissipation and Power Consumption in a HiPath 3550

Appendix A, “Identifying System Power Requirement” contains information on the power requirements of individual boards and components.

2.4.5.2 Specifications for the Uninterruptible Power Supply

Refer to Section 2.4.3.2 for details on the UPSC-D.

2.4.6 Additional Power Supply from the EPSU2

An EPSU2 external power supply must be used if the total number of $U_{P0/E}$ stations, analog stations, and stations connected using adapters is greater than 72.

Additional power can be made available by connecting the external EPSU2 power supply. For this, the EPSU2's DC connection needs to be connected to the special –48 Vdc input on the UPSC-D. The UPSC-D's internal -48-V output is deactivated when the external power supply is connected.

EPSU2 technical specifications

Table 2-23 EPSU2 - Technical Specifications

	EPSU2 S30122-K7221-X1	**EPSU2 S30122-K7221-X2**
Scope of delivery	• EPSU2 AC/DC converter with four UPS batteries loaded • Operating instructions • AC connecting cable (protective grounding plug, IEC-320 socket) • DC cable to UPSC-D, length = 2 m	• EPSU2 AC/DC converter without batteries • Operating instructions • AC connecting cable (protective grounding plug, IEC-320 socket) • DC cable to UPSC-D, length = 2 m
AC power cable	• C39195-Z7001-C17 Euro angled • C39195-Z7001-C20 GBR angled	
AC power	100 - 240 V ac	
Frequency range	47 to 63 Hz	
Connected output	200 W	
Output power consumption/ nominal output	140 W	
Mains/nominal voltage	54.2 V	
UPS batteries	V39113-W5123-E891 Four batteries are supplied built-in.	V39113-W5123-E891 Batteries are not included in the scope of supply and must be ordered separately.

Table 2-23 EPSU2 - Technical Specifications

	EPSU2 S30122-K7221-X1	**EPSU2 S30122-K7221-X2**
Battery operation: • Permitted batteries Manufacturer/type number • Number of batteries • Size (Ah) • Nominal voltage • Overload protection	• CSB/EVX-1270, Hitachi/HP6.5-12, Yuasa/NP6-12, Varta/ Noack 43720303, Sonnenschein/0719143200, Panasonic/ LCR12-7P • 4 units, 12 V each • 7 Ah • 48 V (fully charged 54 V, discharge to 44 V) • Melting fuse 5 x 20 mm, 2.5 A/slow-blowing	
Nominal current	2.5 A	
Overload protection	Electronic current limiting circuit	
Ambient temperature	In buildings, +5 to +45 °C (41 to 113 °F)	
Humidity	95%/non-condensing	
Cooling	Natural convection	
Protection	IP 21 (DIN 40050)	
Housing dimensions (W x D x H in mm)	250 x 114 x 317	
Weight	approx. 14.1 kg (incl. batteries)	approx. 4.1 kg (without batteries)
Symbol	CE	
Personal safety, insulation	EN60950 and IEC950	
Grounding, shielding	Protection class 1, output is floating against ground.	

2.5 HiPath 3350

2.5.1 Hardware Overview

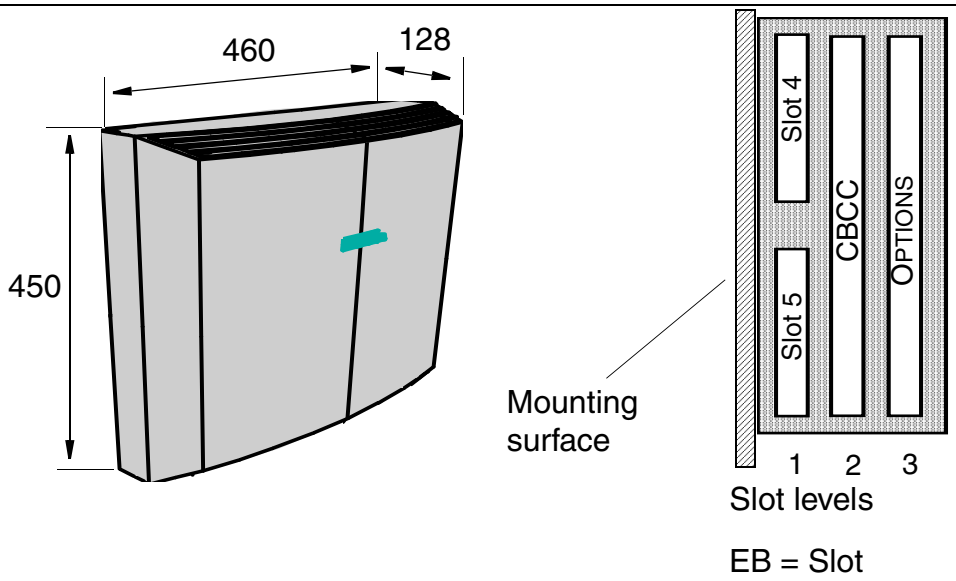
The HiPath 3350 housing intended for wall mounting contains one shelf with three slot levels. The slot levels, numbered in ascending order from the attachment side, have the following assignments:

- Slot level 1: peripheral boards (two slots)
- Slot level 2: CBCC control board only
- Slot level 3: optional boards (up to 5 modules)

The power supply unit is located on the back of the subrack.

The HiPath 3350 does not need an external main distribution frame; the connecting to the peripherals (such as telephones or trunks) connect directly to the boards.

Dimensions and Slots



Note:
When mounting the system on the wall, plan for at least 30 cm of clearance on the board side for replacing the boards.

Figure 2-14 Dimensions and Slots in HiPath 3350

2.5.2 Static Traffic Capacity

The HiPath 3350 system has the following static traffic capacities.

Table 2-24 HiPath 3350 - Static Traffic Capacity

System	Slots	Static Traffic Capacity	Total static traffic capacity of the system
HiPath 3350 (see Figure 2-14)	2 / 3 (CBCC)	24 erlangs	56 erlangs
	4	16 erlangs	
	5	16 erlangs	

2.5.3 Central Components

2.5.3.1 CBCC

Introduction

The CBCC (**C**entral **B**oard with **C**oldfire **C**om) board performs all central control and switching functions for HiPath 3350.

Subboards

The following subboards (some of which are optional) can be used depending on the application:

- CMS clock module small
  - supports all two-channel cordless connections to the HiPath 3550, HiPath 3350, HiPath 3500 and HiPath 3300 systems.
  - provides the master clock for digital networking.

  Section 2.11 contains additional information on when CMS is used.
- ADPCM (CMA) clock module
  - supports the 4-channel CMI connection over BS3/1 to the HiPath 3550, HiPath 3350, HiPath 3500 and HiPath 3300 systems.
  - in the same way as the CMS clock module small, provides the master clock for digital networking.

  Section 2.11 contains additional information on when CMA is used.
- MMC multimedia card
  This plug-in memory card contains the CDB backup and the version-specific APS. Please note that the MMC may only be replaced by a multimedia card approved by Siemens AG. Cards that have not been approved may have a different internal structure which can affect temporal access and certain features (for example, CDB backup and APS transfer).
- IMODN Integrated Modem Card New
  This plug-in card allows remote service (analog mode up to 33.6 Kbps), without having to use an external modem.
- LIM LAN interface module
  This subboard makes available an Ethernet (10BaseT/10 Mbps) LAN connection using an 8-pin RJ45 jack (see Section 2.5.3.4).
- MPPI (music on hold)

Interfaces

- Eight $U_{P0/E}$ (digital subscriber line interfaces)
  In HiPath 3000 V1.2 and later up to seven BS3/1 base stations can be connected directly for HiPath Cordless Office.
- Four T/Rs (analog subscriber line interfaces)
- Two S_0 interfaces (trunk or subscriber or fixed connection)
- V.24 interfaces
  First V.24 interface on the CBCC; the second interface is implemented using the V24/1 option.

2.5.3.2 PSUP

The power supply point PSUP is intended for use in HiPath 3350. The device plugs into a special slot and is secured by screws. It connects to the power outlet using a modular power cord. A monitoring LED indicates the presence of the 5 V output voltage.

Technical specifications

- Nominal voltage range: 100 Vac - 240 Vac
- Nominal frequency: 50 Hz - 60 Hz
- Ring generator: 75 Vac, 20/25/50 Hz
- Partial voltages: +5 Vdc, –48 V
- Power consumption: 60 W

2.5.3.3 UPSC-D

Introduction

This board combines the power supply and battery management functions. No other components are required if operated as a power supply. To maintain short-term battery emergency operation after a power failure, that is, to use uninterruptible power supply functions, you must also connect a battery pack.

Technical specifications

- Nominal voltage range: 100 Vac - 240 Vac
- Nominal frequency: 50 Hz - 60 Hz
- Ring generator: 75 Vac, 20/25/50 Hz

- Partial voltages: +5 Vdc, –48 V
- Battery charger: 4 x 12 V (40.8 V-55.2 V)
- Power consumption: approx. 90 W
- Bridging times
  The following table lists the maximum bridging times (battery operation in case of power failure) available with the battery pack S30122-K5928-X (48 V/1.2 Ah).

  Table 2-25 UPSC-D - Bridging Times with Battery Pack S30122-K5928-X (48 V/ 1.2 Ah)

System	Power supply unit	Load levels	Maximum bridging time
HiPath 3350	UPSC-D	Normal output load = 5 V/3 A; –48 V/0.5 A; ringing approx. 2 VA	19 min
Measurement conditions: • All measurements were performed at a room temperature of approximately 23 °C (73.4°F). • The batteries were fully charged when the measurement was started.			

2.5.3.4 LIM

The **L**AN **I**nterface **M**odule (LIM - S30807-Q6930-X) is an optional plug-in card for all HiPath 3000 central control boards (see also Section 4.4).

The board provides an Ethernet (10BaseT/10 Mbps) LAN connection via an 8-pin RJ45 jack.

The LIM module can be used for administration via HiPath 3000 Manager E and for CTI functions (TAPI 120 V2.0). However, bear in mind that the number of BHCAs (Busy Hour Call Attempts = number of connection attempts during busy traffic hours) is restricted to 400 at a maximum of six TAPI ports. The use of "power dialers" is not approved.

You cannot operate the LIM module and a HG 1500 board simultaneously in one system.

2.5.4 Peripheral Components

2.5.4.1 Subscriber Line Modules

Table 2-26 Subscriber Line Modules for HiPath 3350

Board Name	Capacity			Country		Type/Description
	Ports per board	B channels per board	Max. number of boards per system	ROW	U.S.	
4SLA	4		2	x	-	Board for connecting analog stations (a/b, T/R)
8SLA	8		2	x	x	Board for connecting analog stations (a/b, T/R)
16SLA	16		2	x	-	Board for connecting analog stations (a/b, T/R)
HXGS3	2	8	1 (2[1])	x	x	HG 1500 board for the direct connection of IP workpoint clients.
IVMP8	8	8	1	x	-	These boards are for the integrated voicemail functions of HiPath Xpressions Compact.
IVMS8	8	8	1	x	x	
SLU8	8	16	2	x	x	Board for connecting optiPoint 500 and optiset E telephones ($U_{P0/E}$)
STLS2	2	4	2	x	-	Board for ISDN basic rate access. Configuration of ISDN trunks, tie trunks, and stations (no feeding) on the same board is possible.
STLS4	4	8	2	x	x	

1 The system may be configured with two HG 1500 boards if PDM1 is not used.

2.5.4.2 Trunk Boards

Table 2-27 Trunk Boards for HiPath 3350

Board Name	Capacity			Country		Type/Description
	Ports per board	B channels per board	Max. number of boards per system	ROW	U.S.	
TLA2	2		2	x	-	Trunk board for analog lines
TLA4	4		2	x	-	Trunk board for analog lines
TLA8	8		2	x	-	Trunk board for analog lines
STLS2	2	4	2	x	-	Board for ISDN basic access. Permits configuration of ISDN trunks, tie trunks, and subscribers (no feeding) on the same board.
STLS4	4	8	1	x	x	
TMGL4	4		2	-	x	Board for connecting analog trunks
TMQ4	4	8	2	-	x	BRI board

2.5.4.3 Boards for Tie Trunk Traffic

Table 2-28 Tie Trunk Traffic Boards for HiPath 3350

Board Name	Capacity			Country		Type/Description
	Ports per board	B channels per board	Max. number of boards per system	ROW	U.S.	
HXGS3	2	8	1 (2[1])	x	x	HG 1500 board for connecting the HiPath 3350 system directly to a local data network (Ethernet).

Table 2-28 Tie Trunk Traffic Boards for HiPath 3350

Board Name	Capacity			Country		Type/Description
	Ports per board	B channels per board	Max. number of boards per system	ROW	U.S.	
STLS2	2	4	2	x	-	Board for ISDN basic access. Permits configuration of ISDN trunks, tie trunks, and subscribers (no feeding) on the same board.
STLS4	4	8	1	x	x	

1 The system may be configured with two HG 1500 boards if PDM1 is not used.

2.5.4.4 Options

Table 2-29 Optional Boards for HiPath 3350

Board Name	Capacity		Country		Type/Description
			ROW	U.S.	
ALUM4	Trunk failure transfers	4	x	x	Trunk failure transfer; this board transfers loop start trunks directly to internal analog stations in the event of a power failure (note the signaling method used).
ANI4	Analog trunks	4	-	x	This board allows calling line identification (caller ID) in conjunction with TMGL4.
GEE12	Number of call charge receivers	4	x	-	This optional board records the country-specific call charge pulses (12 kHz) from the trunk.
GEE16	Number of call charge receivers	4	x	-	This optional board records the country-specific call charge pulses (16 kHz) from the trunk.
GEE50	Number of call charge receivers	4	x	-	This optional board records the country-specific call charge pulses (50 Hz) from the trunk.

Table 2-29 Optional Boards for HiPath 3350

Board Name	Capacity		Country		Type/Description
			ROW	U.S.	
V24/1	Interfaces	1	x	x	Serial V.24 interface for connecting a PC, printer, or Plus Products
STBG4			x	-	Current-limiting module for LS interface (France only)
EXM			x	-	External music on hold
EXMNA			-	x	External music on hold (A-LAW)
MPPI			x	-	Music on hold (MOH)
UAM			x	-	Announcement before answering/music on hold/relay/ sensor
STRB	Sensors	4	x	x	Control relay module; provides 4 relays and 4 sensors for controlling external devices or detecting external control events.
	Relays	4			

2.5.5 Additional System Data

2.5.5.1 Heat Dissipation and Power Consumption

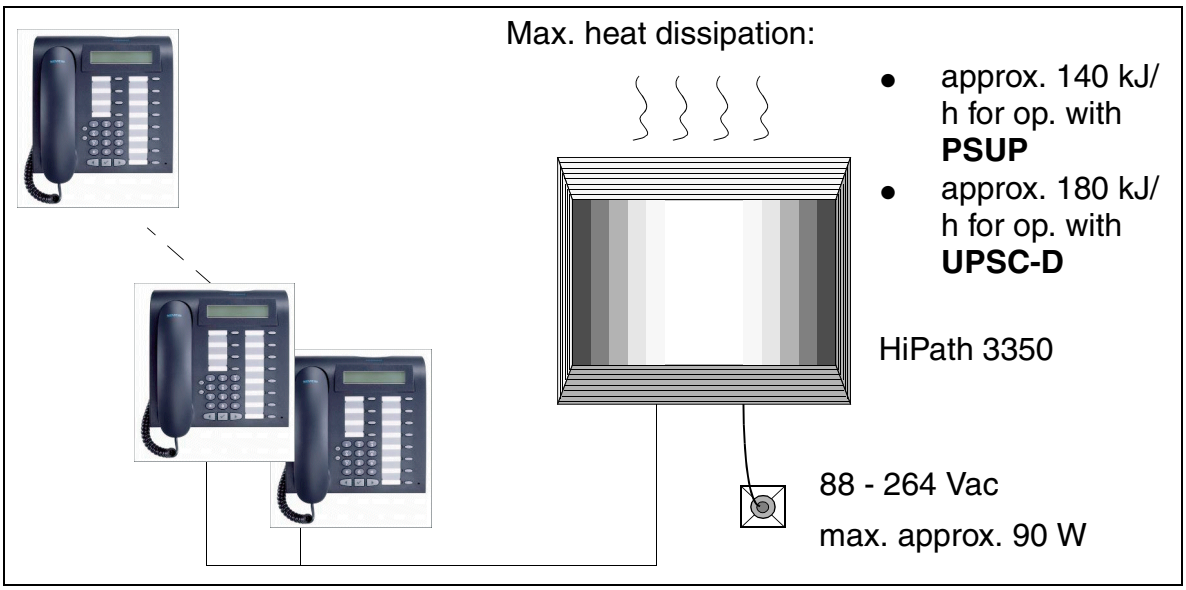


Figure 2-15 Heat Dissipation and Power Consumption in a HiPath 3350 with PSUP/UPSC-D

Appendix A, “Identifying System Power Requirement” contains information on the power requirements of individual boards and components.

2.5.5.2 Specifications for the Uninterruptible Power Supply

Refer to Section 2.5.3.3 for details on the UPSC-D.

2.6 HiPath 3250

HiPath 3250 is replaced by HiPath 540.

2.7 HiPath 3150

HiPath 3150 is replaced by HiPath 520.

2.8 HiPath 3700

2.8.1 Hardware Overview

The HiPath 3700 system has a modular structure and can be extended by adding new boards or cabinets to accommodate growing customer requirements. An additional cabinet is referred to as an expansion cabinet.

You will need a special mounting kit for installing the system in a 19” cabinet.

A HiPath 3700 system can have a maximum of three cabinets. The 19” cabinets must be placed beside one another and they must also be accessible from the rear.

The basic cabinet has 7 slots for peripheral boards. Expansion cabinets with 8 slots each for peripheral boards are implemented for expansions. As a result, when 2 expansion cabinets are implemented, a total of 23 slots are available for boards; with the exception of slot 08 in the basic cabinet, which has an installation width of 45 mm, all slots have an installation width of 30 mm.

Dimensions

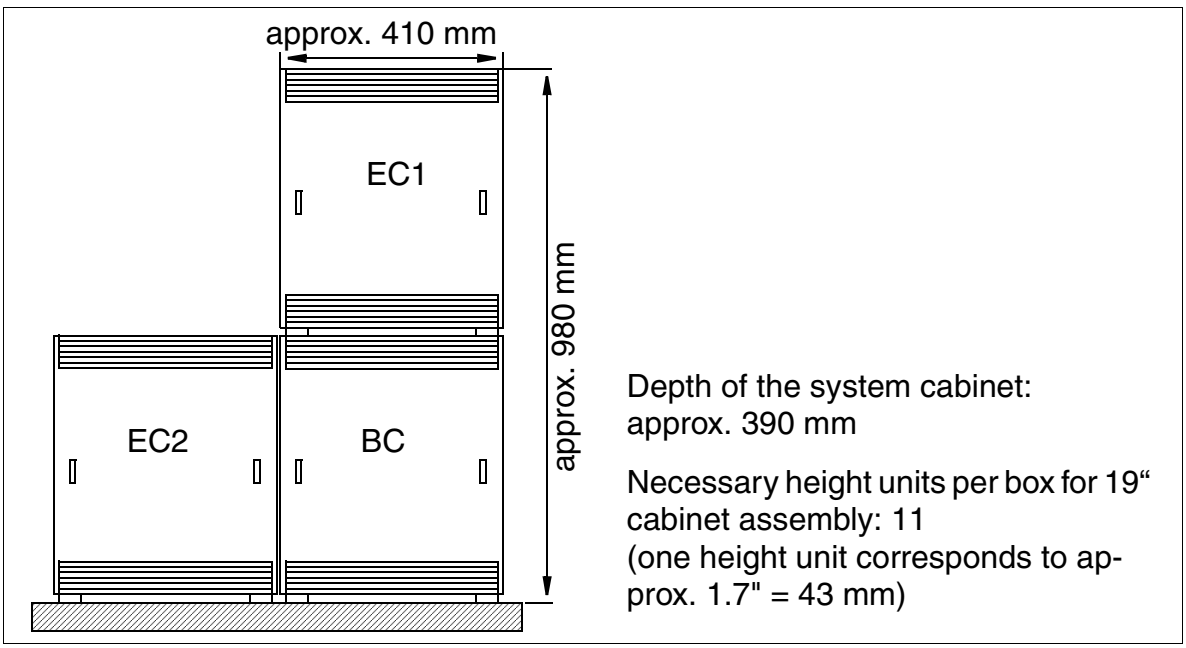


Figure 2-16 HiPath 3700 Dimensions

2.8.1.1 Board Slots

Nine board slots are available in each cabinet. The following boards are assigned permanent slots:

- CBCPR central control board -> slot 01 in the BC
- UPSM power supply unit -> slot 09 in the BC, slot 18 in EC1, slot 27 in EC2.

Depending on their width, peripheral boards can be inserted in slots 02 to 08 in the BC, 10 to 17 in EC1 and 19 to 26 in EC2 (the adhesive label beneath each slot identifies the slot).

Slots in Basic and Expansion Cabinets

Slot no.:									
BC:	CBCPR	02	03	04	05	06	07	08	UPSM
EC1:	10	11	12	13	14	15	16	17	UPSM
EC2:	19	20	21	22	23	24	25	26	UPSM
Width in mm:	45/30	30	30	30	30	30	30	45/30	90
	X10	X20	X30	X40	X50	X60	X70	X80	X90

Figure 2-17 Board Slots in “8-Slot” Basic and Expansion Cabinets

2.8.2 Distribution of PCM Segments

There are approximately 64 time-division multiplex channels available for each PCM segment. Blockages occur when these channels are busy. This prevents the system from performing any more call jobs.

To guarantee that the system operates without blocking, ensure during configuration that the boards on a PCM segment do not require more than the maximum 64 time-division multiplex channels. The following table lists the number of time-division multiplex channels that the different boards require.

Table 2-30 HiPath 3700 - Number of Time-Division Multiplex Channels Required per Board

Board	Number of time-division multiplex channels required
CR8N	8
HXGM3	16
IVML8	8
IVML24	24
SLA8N, SLA16N, SLA24N	Depends on the number of stations
SLC16, SLC16N	Depends on the number of mobile telephones logged on
SLMO8, SLMO24	Depends on the number of stations (hosts (master) **and** clients (slaves))
STMD8	16
TIEL	4
TMDID8	8
TML8W	8
TMOM	1
TMS2	30
TMST1	24

A tool is available at the following intranet address to illustrate PCM segments in HiPath 3700 systems:
https://netinfo4.wit.siemens.de/icnenho/vulcan_v10/product/vf_doku/tool

Caution
To guarantee that the system operates without faults or blocking, it is necessary that you observe the following rules for the configuration of boards:

- **SLC16, SLC16N**
  - A maximum of one SLC16 or SLC16N per PCM section. If possible, the SLC16 or SLC16N should remain alone on the PCM segment.
  - For more information on multi-SLCs, see Multi-SLC and Cross-System Networking.
- **IVML8, IVML24**
  - A maximum of one IVML8 or IVML24 per system.
  - This board may only be inserted into the slot beside the power supply in the basic cabinet or in the expansion cabinets.
  - You may not insert an SLC16 or SLC16N on the PCM segment of the IVML8 or IVML24.
  - You may not insert an SLMO24 on the PCM segment of the IVML24.
  - If there is a TMS2 on the PCM segment of the IVML24, only one board with up to eight ports is allowed on the free slot.
- **SLMO24**
  A maximum of two SLMO24s per PCM segment; the number of connected stations (hosts (master) **and** clients (slaves)) may not be more than 64.

The illustrations below show the PCM segments (64 time-division multiplex channels each) between the different HiPath 3700 system configurations.

Single-cabinet system: PCM segments

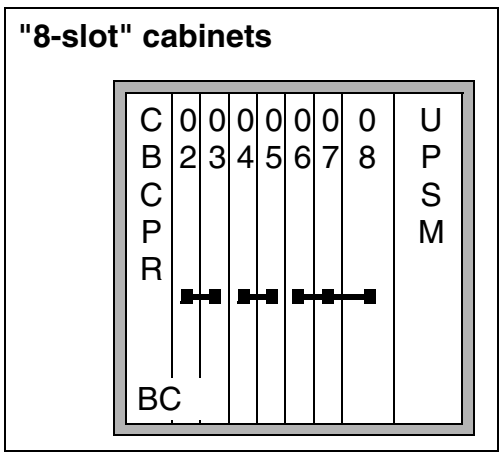


Figure 2-18 PCM Segments for a Single-Cabinet System

Two-cabinet system: PCM segments

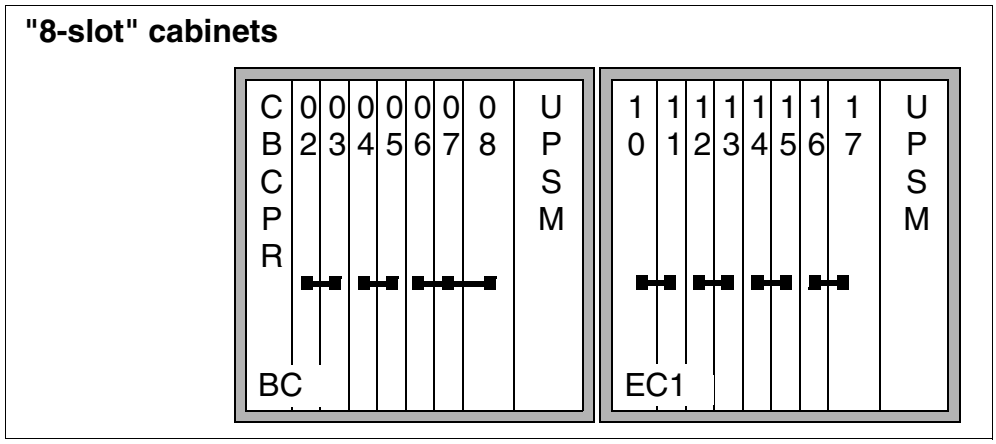


Figure 2-19 PCM Segments for a Two-Cabinet System

Three-cabinet system: PCM segments

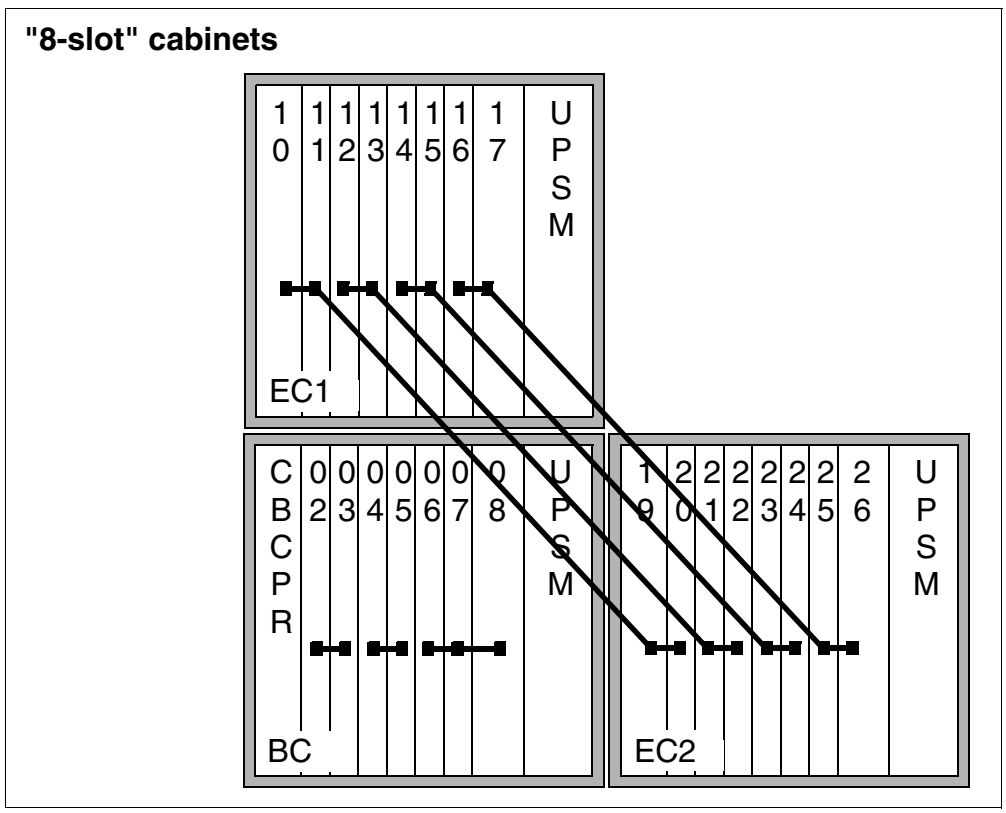


Figure 2-20 PCM Segments for a Three-Cabinet System

2.8.3 Static Traffic Capacity

The static traffic capacity of the HiPath 3700 can be determined as follows.

Table 2-31 HiPath 3700 - Static Traffic Capacity

HiPath 3700	Slots per PCM segment	Static traffic capacity per PCM segment	Total static traffic capacity of the system
Single-cabinet system (see Figure 2-18)	02 + 03	64 erlangs	192 erlangs
	04 + 05	64 erlangs	
	06 + 07 + 08	64 erlangs	
Two-cabinet system (see Figure 2-19)	02 + 03	64 erlangs	448 erlangs
	04 + 05	64 erlangs	
	06 + 07 + 08	64 erlangs	
	10 + 11	64 erlangs	
	12 + 13	64 erlangs	
	14 + 15	64 erlangs	
	16 + 17	64 erlangs	
Three-cabinet system (see Figure 2-20)	02 + 03	64 erlangs	448 erlangs
	04 + 05	64 erlangs	
	06 + 07 + 08	64 erlangs	
	10 + 11 + 19 + 20	64 erlangs	
	12 + 13 + 21 + 22	64 erlangs	
	14 + 15 + 23 + 24	64 erlangs	
	16 + 17 + 25 + 26	64 erlangs	

2.8.4 Central Components

2.8.4.1 CBCPR

Introduction

The CBCPR board performs all central control and switching functions for HiPath 3700.

Subboards

The following subboards (some of which are optional) can be used depending on the application:

- CMS clock module small
  - supports all 4, 8 and 12 channel CMI connections using the SLC16 board of the HiPath 3750, HiPath 3550 and HiPath 3700 systems.
  - provides the master clock for digital networking.

  Section 2.11 contains additional information on when CMS is used.
- MMC multimedia card
  This plug-in memory card contains the CDB backup and the version-specific APS. Please note that the MMC may only be replaced by a multimedia card approved by Siemens AG. Cards that have not been approved may have a different internal structure which can affect temporal access and certain features (for example, CDB backup and APS transfer).
- IMODN Integrated Modem Card New
  This plug-in card allows remote service (analog mode up to 33.6 Kbps), without having to use an external modem.
- LIM LAN interface module
  This subboard makes available an Ethernet (10BaseT/10 Mbps) LAN connection using an 8-pin RJ45 jack (see Section 2.8.4.3).
- MPPI (music on hold)

V.24 interfaces

- To connect a service PC, you can access the first V.24 interface (9-pin SUB-D plug) on the CBCPR from the front of the basic cabinet (after removing the cover).
- You can access the second V.24 interface (25-pin SUB-D plug) via the backplane of the basic cabinet (X7).

2.8.4.2 UPSM

Introduction

Each cabinet in HiPath 3700 requires one UPSM (**U**ninterruptible **P**ower **S**upply **M**odular). This board combines the power supply and battery management functions. No other components are required if operated as a power supply. To maintain short-term battery emergency operation after a power failure, that is, to use uninterruptible power supply functions, you must also connect a battery pack for each system cabinet or a BSG 48/38 battery cabinet (including battery charger) to the UPSM.

An LED lights up to indicate that the UPSM is in operation. The UPSM must be replaced when defective (LED does not light up).
All country-specific versions of the UPSM are used. The ring frequency of the modular ring generator can be parameterized to suit country-specific requirements.

Part numbers

- UPSM: S30122-K5950-S100, S30122-K5950-A100
- Battery pack 4 x 12 V / 7 Ah: S30122-K5950-Y200
  (The connecting cable for the UPSM is integrated with the battery pack.)

Technical specifications

- Nominal voltage range: 100 Vac - 240 Vac
- Nominal frequency: 50 Hz - 60 Hz
- Max. input current consumption: 5.4 A - 2.7 A
- Max. power consumption: approx. 430 W
- Output voltage (battery charging voltage): 42.5 - 55.2 VDC
- Output current (battery charge current): $\geq$ 0.8 A
  (sufficient for battery set rating) = 7 Ah)

- Bridging times
  The following table lists the maximum bridging times (battery operation in case of power failure) available with the battery pack S30122-K5950-Y200 (48 V/7 Ah).

  Table 2-32 UPSM - Bridging Times with Battery Pack S30122-K5950-Y200 (48 V/ 7 Ah)

System	Power supply unit	Load levels	Maximum bridging time
HiPath 3700	UPSM	100% nominal load	1 h
HiPath 3700	UPSM	60% nominal load	1h 40min
Measurement conditions: • All measurements were performed at a room temperature of approximately 22 °C (71.6 °F). • The cut-off voltage is 1.7 V per cell. • The batteries were new and fully charged when measurement started.			

  The battery recharging time is approx. 8.5 h.

Specifications of the modular ring generator

- Rated output voltages: 75 V_{act}
- Output frequencies: 20/25/50 Hz
- Output power
  - continuous: 4.0 VA
  - peak: 8.0 VA temporary (3 min. load/15 min. break)

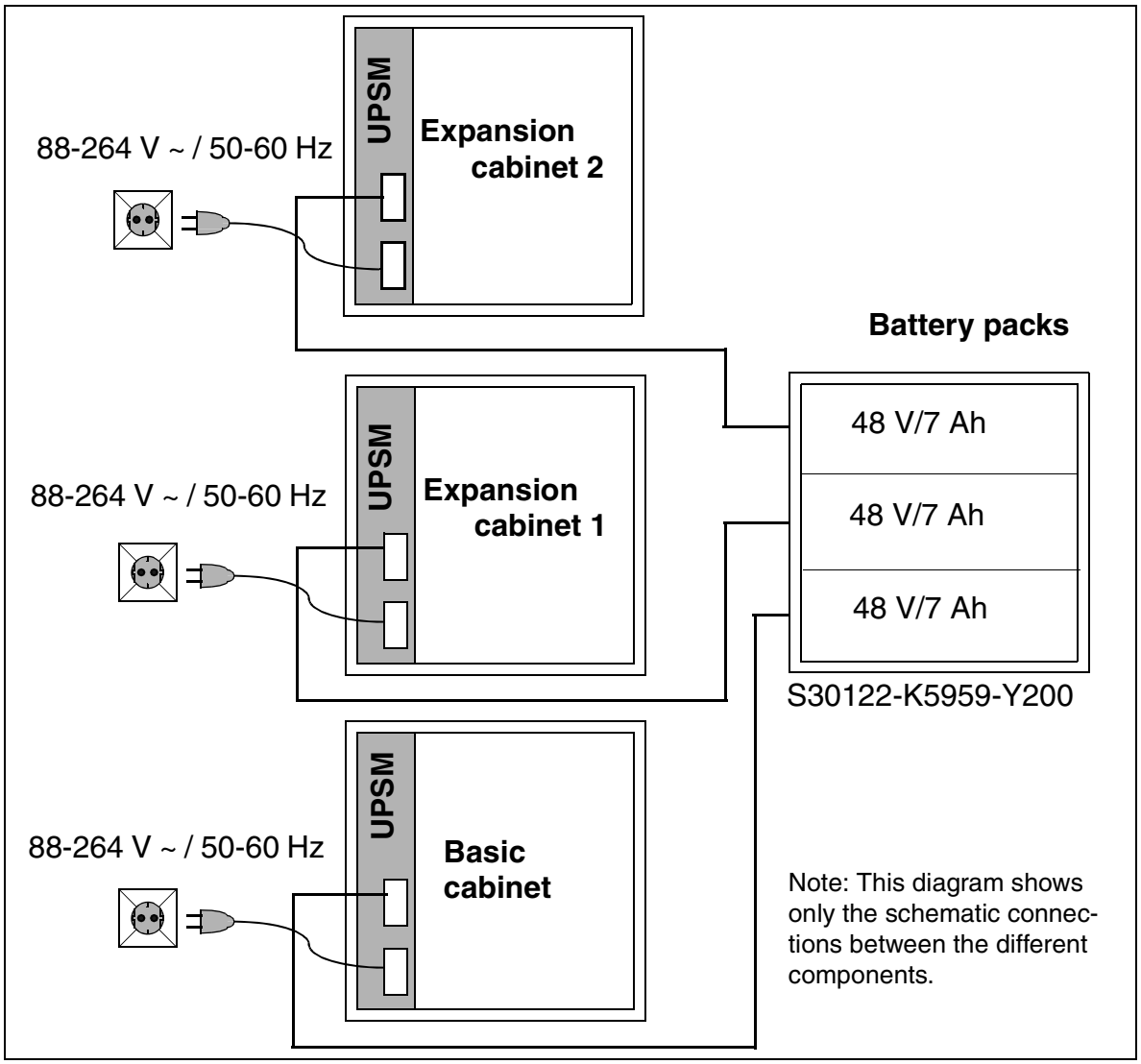
BSG 48/38

You can use a BSG 48/38 battery cabinet in an upright housing instead of the battery pack to extend the bridging time in the event of a power failure. The BSG 48/38 battery cabinet (S30122-K5950-F300) consists of

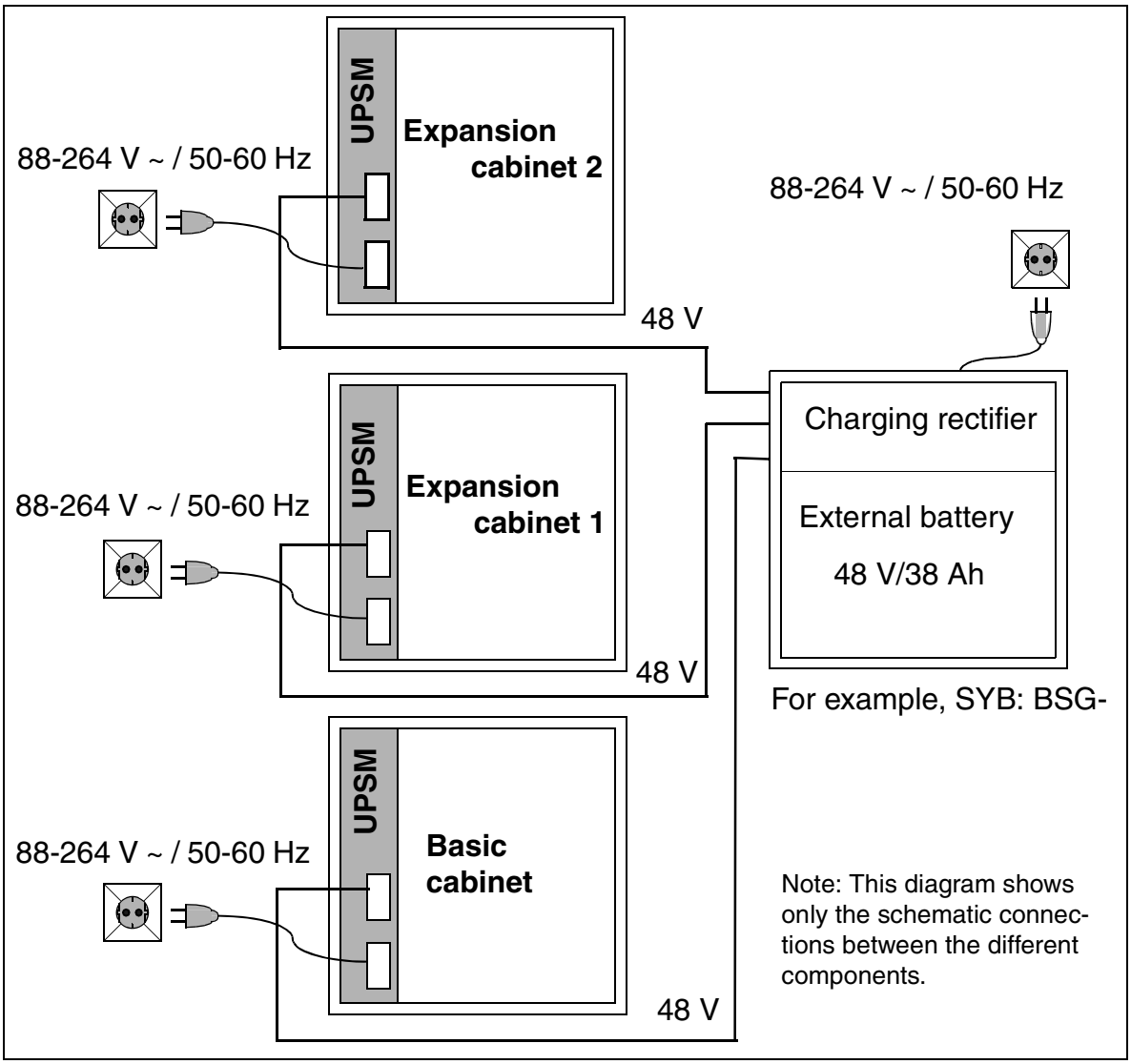
- an upright housing
- a charging rectifier
- a battery set (38 Ah/48 V)

The battery cabinet is designed for direct connection to the HiPath 3700 communication system.

UPSM and Battery Packs with no Ext. Charging Rectifiers



Connecting the UPSM with Battery Packs and Ext. Charging Rectifiers



2.8.4.3 LIM

The **L**AN **I**nterface **M**odule (LIM - S30807-Q6930-X) is an optional plug-in card for all HiPath 3000 central control boards (see also Section 4.4).

The board provides an Ethernet (10BaseT/10 Mbps) LAN connection via an 8-pin RJ45 jack.

The LIM module can be used for administration via HiPath 3000 Manager E and for CTI functions (TAPI 120 V2.0). However, bear in mind that the number of BHCAs (Busy Hour Call Attempts = number of connection attempts during busy traffic hours) is restricted to 400 at a maximum of six TAPI ports. The use of "power dialers" is not approved.

You cannot operate the LIM module and a HG 1500 board simultaneously in one system.

2.8.5 Peripheral Components

2.8.5.1 Subscriber Line Modules

Table 2-33 Subscriber Line Modules for HiPath 3700

Board Name	Capacity				Country		Type/Description
	Ports per board	B channels per board	Boards per cabinet	Max. number of boards per system	ROW	U.S.	
HXGM3	2	16	4	8	x	x	HG 1500 board for the direct connection of IP workpoint clients.
IVML8	8	8	1	1	x	x	These boards are for the integrated voicemail functions of HiPath Xpressions Compact.
IVML24	24	24	1	1	x	x	
SLA8N	8		#[1]	#[1]	x	-	Board with eight analog interfaces
SLA16N	16		#[1]	#[1]	x	x	Board with 16 analog interfaces
SLA24N	24		#[1]	#[1]	x	x	Board with 24 analog interfaces
SLC16	16	64	4[2]	4	x	-	Boards for connecting up to 16 base stations to the system.
SLC16N	16	64	4[3]	4	x	-	
SLMO8	8	16	#[1]	#[1]	x	-	Board for connecting optiPoint 500 and optiset E telephones. The SLMO board comes in 8- and 24-port versions.
SLMO24	24	48	#[1]	#[1]	x	x	
STMD8	8	16	6	8	x	x	Board for ISDN basic access. Permits configuration of ISDN trunks, tie trunks, and subscribers on the same board.

1 The maximum number is calculated on the basis of the system-specific capacity limits in Table 2-1.
2 Exception: Basic cabinets can have up to two SLC16 boards.
3 Exception: Basic cabinets can have up to two SLC16N boards.

2.8.5.2 Trunk Boards

Table 2-34 Trunk Boards for HiPath 3700

Board Name	Capacity				Country		Type/Description
	Ports per board	B channels per board	Boards per cabinet	Max. number of boards per system	ROW	U.S.	
TML8W	8		#[1]	#[1]	x	-	Board with eight ports for connecting loop start trunks.
STMD8	8	16	#[1]	#[1]	x	x	Board for ISDN basic access. Permits mixed configuration of ISDN trunks, tie trunks, and subscribers on the same board.
TMS2	30	30	#[1]	6	x	-	Basic rate interface (BRI) board; can also be used for tie trunk traffic.
TMST1	24	24	#[1]	8	-	x	ISDN interface board
TMDID	8		#[1]	#[1]	-	x	Analog trunk board for direct inward dialing
TMGL8	8		#[1]	#[1]	-	x	Analog trunk board (ground/loop start)
TMAMF	8				x	-	Analog trunk board for direct inward dialing (MFC-R2)

1 The maximum number is calculated on the basis of the system-specific capacity limits in Table 2-1.

2.8.5.3 Boards for Tie Trunk Traffic

Table 2-35 Tie Trunk Traffic Boards for HiPath 3700

Board Name	Capacity				Country		Type/Description
	Ports per board	B channels per board	Boards per cabinet	Max. number of boards per system	ROW	U.S.	
TIEL	4		#[1]	#[1]	x	x	Board for providing four two-way analog tie trunk circuits with E&M signaling.
STMD8	8	16	#[1]	#[1]	x	x	Board for ISDN basic access. Permits configuration of ISDN trunks, tie trunks, and subscribers (no feeding) on the same board.
HXGM3	2	16	4	8	x	x	HG 1500 board for connecting the HiPath 3700 system directly to a local IP network (Ethernet).
TMS2	30	30	#[1]	6	x	-	Basic rate interface (BRI) board; can also be used for tie trunk traffic.

1 The maximum number is calculated on the basis of the system-specific capacity limits in Table 2-1.

2.8.5.4 Options

Table 2-36 Optional Boards for HiPath 3700

Board Name	Capacity		Country		Type/Description
			ROW	U.S.	
TIEL	Ports per board	4	x	x	In addition to its tie trunk circuit function, this board can also be used for connecting announcement equipment (with start/stop signaling for announcement before answering).
REAL	Relay connections	4	x	x	The REAL board is located on the basic cabinet's backplane. It is used for relay connection (such as a door opener) and power failure transfer (ALUM).
	Trunk failure transfers	1			
GEE8	Number of analog trunks supported	8	x	-	This board can be plugged into the TML8W analog trunk circuit board. It records call charge pulses from the trunk on a country-specific basis for up to eight trunks.
CR8N			x	x	The board has eight code transmitters and receivers.
LIM			x	x	Ethernet (10BaseT) interface

2.8.6 Additional System Data

2.8.6.1 Heat Dissipation and Power Consumption

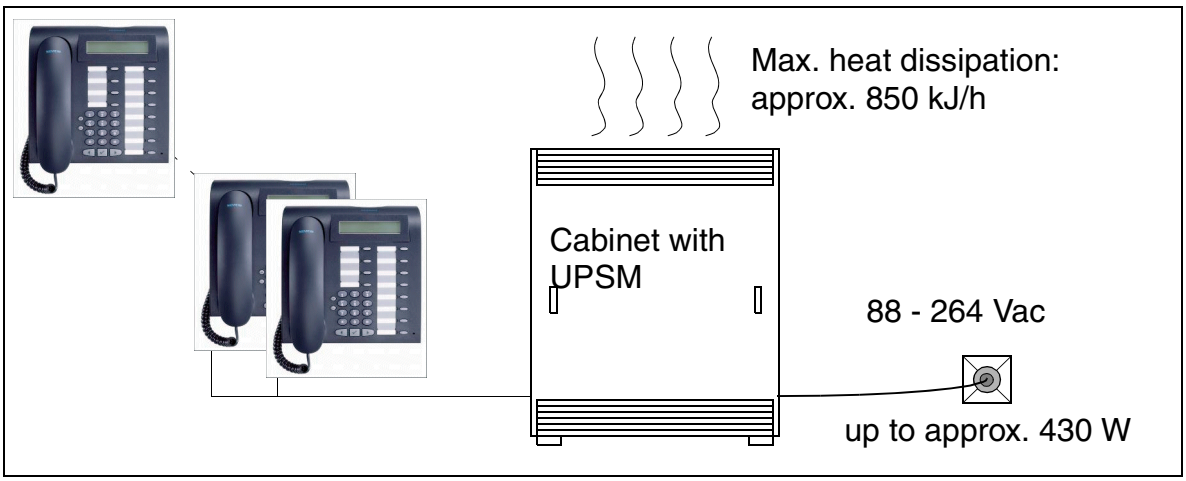


Figure 2-21 Heat Dissipation and Power Consumption in a HiPath 3700 Cabinet

Appendix A, “Identifying System Power Requirement” contains information on the power requirements of individual boards and components.

2.8.6.2 Specifications for the Uninterruptible Power Supply UPSM

Refer to Section 2.8.4.2 for details on the UPSM.

2.8.7 Expansion Cabinet Rack ECR

When installing the system, an ECR in the 19” cabinet is required if emergency battery operation is necessary during a power failure or if the system requires uninterruptible power. The necessary battery pack is installed in the ECR.

One ECR for each system cabinet is required.

There are switches for the line and battery voltage on the front panel as well as a fuse for protecting the battery circuit. The jacks for the line and battery voltage are located on the rear of the housing. The line voltage is only fed through and can be interrupted using a switch.

2.9 HiPath 3500

2.9.1 Hardware Overview

Structure

The HiPath 3500 housing intended for use with 19’ cabinets contains four slot levels with the following assignments:

- Slot levels 1-3: slide-in shelves for peripheral boards (2 boards can be plugged in on each level)
- Slot level 4: slide-in shelf for CBRC control board
- Slot level 5: optional boards (up to 3 modules)

The power supply unit is located on the back of the subrack.

The connection to peripherals (telephones, trunks, and others) is set up using MW8 jacks in the front panels of the boards.

Dimensions and Slots

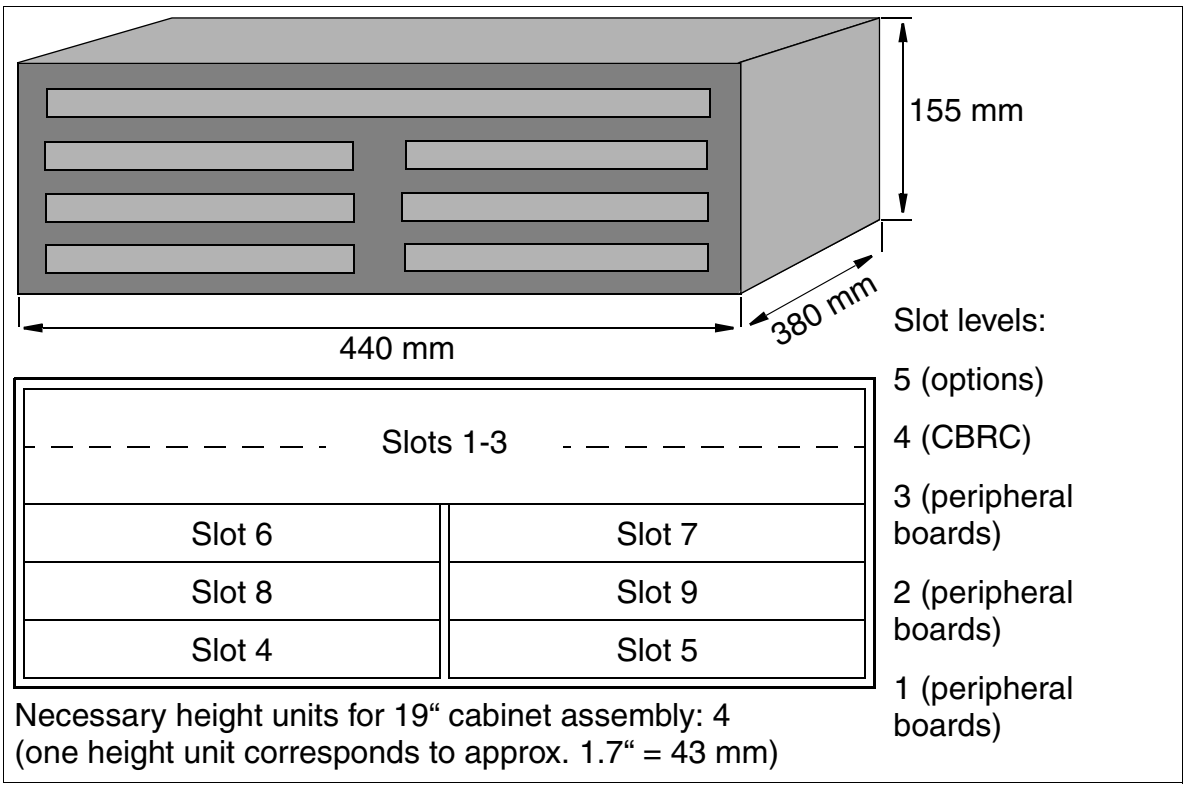


Figure 2-22 Dimensions and Slots in HiPath 3500

2.9.2 Static Traffic Capacity

The HiPath 3500 system has the following static traffic capacities.

Table 2-37 HiPath 3500 - Static Traffic Capacity

System	Slots	Static Traffic Capacity	Total static traffic capacity of the system
HiPath 3500 (see Figure 2-22)	2 / 3 (CBRC)	24 erlangs	134 erlangs
	4	16 erlangs	
	5	16 erlangs	
	6	16 erlangs	
	7	16 erlangs	
	8	16 erlangs	
	9	30 erlangs[1]	

1 Use of a TS2R board results in a capacity of 30 erlangs. A maximum of one TS2R per HiPath 3500 is possible, and the board may only be installed in slot 7 or 9, thus resulting in 30 Erlangs for slot 7 or 9.

2.9.3 Central Components

2.9.3.1 CBRC

Introduction

The CBRC (**C**entral **B**oard **R**ack with **C**oldfire **C**om) board performs all central control and switching functions for HiPath 3500.

Subboards

The following subboards (some of which are optional) can be used depending on the application:

- CMS clock module small
  - supports all two-channel cordless connections to the HiPath 3550, HiPath 3350, HiPath 3500 and HiPath 3300 systems.
  - provides the master clock for digital networking.

  Section 2.11 contains additional information on when CMS is used.
- ADPCM (CMA) clock module
  - supports the 4-channel CMI connection over BS3/1 to the HiPath 3550, HiPath 3350, HiPath 3500 and HiPath 3300 systems.
  - in the same way as the CMS clock module small, provides the master clock for digital networking.

  Section 2.11 contains additional information on when CMA is used.
- MMC multimedia card
  This plug-in memory card contains the CDB backup and the version-specific APS. Please note that the MMC may only be replaced by a multimedia card approved by Siemens AG. Cards that have not been approved may have a different internal structure which can affect temporal access and certain features (for example, CDB backup and APS transfer).
- IMODN Integrated Modem Card New
  This plug-in card allows remote service (analog mode up to 33.6 Kbps), without having to use an external modem.
- LIM LAN interface module
  This subboard makes available an Ethernet (10BaseT/10 Mbps) LAN connection using an 8-pin RJ45 jack (see Section 2.9.3.3).
- MPPI (music on hold)

Interfaces

- Eight $U_{P0/E}$ (digital subscriber line interfaces)
  Up to seven BS3/1 base stations can be connected directly for HiPath Cordless Office.
- Four T/Rs (analog subscriber line interfaces)
  For Australia only: The T/R interfaces supply a ring voltage of 35 V_{eff}. Depending on the terminals connected, we cannot exclude the possibility of errors occurring during ringing state.
- Two S_0 interfaces (trunk or subscriber or fixed connection)
- One V.24 interface

2.9.3.2 UPSC-DR

Introduction

This board combines the power supply and battery management functions. No other components are required if operated as a power supply. To maintain short-term battery emergency operation after a power failure, that is, to use uninterruptible power supply functions, you must also connect a battery pack.

An EPSU2-R external power supply must be used if the total number of $U_{P0/E}$ stations, analog stations, and stations connected using adapters is greater than 72.

Additional power can be made available by connecting the external EPSU2-R power supply (see Section 2.9.6) To do this, connect the DC port on the EPSU2-R to the special –48 Vdc input on the UPSC-DR. The UPSC-DR's internal -48-V output is deactivated when the external power supply is connected.

Technical specifications

- Nominal voltage range: 100 Vac - 240 Vac
- Nominal frequency: 50 Hz - 60 Hz
- Ring generator: 75 Vac, 20/25/50 Hz
- Partial voltages: +5 Vdc, –48 V
- Battery charger: 4 x 12 V (40.8 V-55.2 V)
- Power consumption: approx. 180 W

- Bridging times
  The following table lists the maximum bridging times (battery operation in case of power failure) available with four batteries V39113-W5123-E891 (4 x 12 V/7 Ah batteries).

  Table 2-38 UPSC-DR - Bridging Times with four Batteries V39113-W5123-E891 (4 x 12 V/7 Ah Batteries)

System	Power supply unit	Load levels	Maximum bridging time
HiPath 3500	UPSC-DR	Normal output load 100 % = 5 V/8 A; –48 V/1.1 A; ringing approx. 4 VA	1h 30min
HiPath 3500	UPSC-DR	Normal output load 60 % = 5 V/4.8 A; –48 V/0.66 A; ringing approx. 2 VA	2h 20min
HiPath 3500	UPSC-DR with EPSU2-R	Normal output load 100 % = 5 V/8 A; –48 V/3 A (external via EPSU2-R); ringing approx. 4 VA	1h 30min
HiPath 3500	UPSC-DR with EPSU2-R	Normal output load 60 % = 5 V/4.8 A; –48 V/1.8 A (external via EPSU2-R); ringing approx. 2 VA	2h 40min
Measurement conditions: • All measurements were performed at a room temperature of approximately 23 °C (73.4 °F). • The batteries were fully charged when the measurement was started.			

2.9.3.3 LIM

The **L**AN **I**nterface **M**odule (LIM - S30807-Q6930-X) is an optional plug-in card for all HiPath 3000 central control boards (see also Section 4.4).

The board provides an Ethernet (10BaseT/10 Mbps) LAN connection via an 8-pin RJ45 jack.

The LIM module can be used for administration via HiPath 3000 Manager E and for CTI functions (TAPI 120 V2.0). However, bear in mind that the number of BHCAs (Busy Hour Call Attempts = number of connection attempts during busy traffic hours) is restricted to 400 at a maximum of six TAPI ports. The use of "power dialers" is not approved.

You cannot operate the LIM module and a HG 1500 board simultaneously in one system.

2.9.4 Peripheral Components

2.9.4.1 Subscriber Line Modules

Table 2-39 Subscriber Line Modules for HiPath 3500

Board Name	Capacity			Country		Type/Description
	Ports per board	B channels per board	Max. number of boards per system	ROW	U.S.	
8SLAR	8		#[1]	x	x	Board for connecting analog stations (a/b, T/R)
HXGR3	2	8	3	x	x	HG 1500 board for the direct connection of IP workpoint clients.
IVMS8R	8	8	1	x	x	Board for the integrated voicemail functions of HiPath Xpressions Compact.
SLU8R	8	16	#[1]	x	x	Board for connecting optiPoint 500 and optiset E telephones ($U_{P0/E}$)
STLS4R	4	8	#[1]	x	x	Board for ISDN basic rate access. Configuration of ISDN trunks, tie trunks, and stations (no feeding) on the same board is possible.

1 The maximum number is calculated on the basis of the system-specific capacity limits in Table 2-1.

2.9.4.2 Trunk Boards

Table 2-40 Trunk Boards for HiPath 3500

Board Name	Capacity			Country		Type/Description
	Ports per board	B channels per board	Max. number of boards per system	ROW	U.S.	
STLS4R	4	8	#[1]	x	x	Board for ISDN basic access. Permits configuration of ISDN trunks, tie trunks, and subscribers (no feeding) on the same board.
TLA4R	4		#[1]	x	-	Trunk board for analog lines including ALUM and call metering receiving equipment board
TMGL4R	4		#[1]	-	x	Trunk board for analog lines
TS2R	30	30	1	x	-	In HiPath 3000/HiPath 5000 V5.0 and later, the B channels in the TS2R board are subject to license. Consequently, the TS2R board S30810-K2913-Z300 has been assigned a new hardware identification code. The new code prevents the board from being used in earlier versions. Functionality and layout of the board have not been changed.
TST1	1	24	1	-	x	PRI board

1 The maximum number is calculated on the basis of the system-specific capacity limits in Table 2-1.

2.9.4.3 Boards for Tie Trunk Traffic

Table 2-41 Tie Trunk Traffic Boards for HiPath 3500

Board Name	Capacity			Country		Type/Description
	Ports per board	B channels per board	Max. number of boards per system	ROW	U.S.	
HXGR3	2	8	3	x	x	HG 1500 board for connecting the HiPath 3500 system directly to a local data network (Ethernet).
TS2R	30	30	1	x	-	In HiPath 3000/HiPath 5000 V5.0 and later, the B channels in the TS2R board are subject to license. Consequently, the TS2R board S30810-K2913-Z300 has been assigned a new hardware identification code. The new code prevents the board from being used in earlier versions. Functionality and layout of the board have not been changed.

2.9.4.4 Options

Table 2-42 Optional Boards for HiPath 3500

Board Name	Capacity		Country		Type/Description
			ROW	U.S.	
ANI4R	Analog trunks	4	-	x	This board allows calling line identification (caller ID) in conjunction with TMGL4R.
EXMR			x	x	External music on hold
MPPI			x	-	Music on hold (MOH)
UAMR			x	-	Announcement before answering/music on hold/relay/sensor
STRBR	Sensors	4	x	x	Control relay module; provides 4 relays and 4 sensors for controlling external devices or detecting external control events.
	Relay	4			

2.9.5 Additional System Data

2.9.5.1 Heat Dissipation and Power Consumption

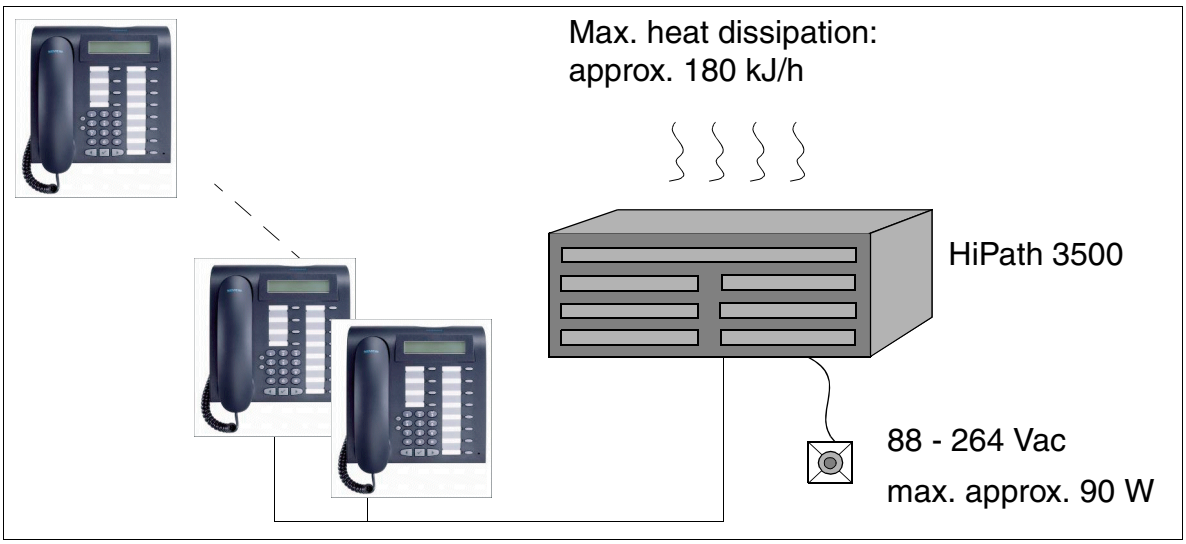


Figure 2-23 Heat Dissipation and Power Consumption in a HiPath 3500

Appendix A, “Identifying System Power Requirement” contains information on the power requirements of individual boards and components.

2.9.5.2 Specifications for the Uninterruptible Power Supply

Refer to Section 2.9.3.2 for details on the UPSC-DR.

2.9.6 Additional Power Supply from the EPSU2-R

An EPSU2-R external power supply must be used if the total number of $U_{P0/E}$ stations, analog stations, and stations connected using adapters is greater than 72.

Additional power can be made available by connecting the external EPSU2-R power supply. To do this, connect the DC port on the EPSU2-R to the special –48 Vdc input on the UPSC-DR. The UPSC-DR's internal -48-V output is deactivated when the external power supply is connected.

The additional EPSU2-R external power supply unit is installed in the ECR.

EPSU2-R technical specifications

Table 2-43 EPSU2-R - Technical Specifications

	EPSU2-R S30122-K7221-X900
Scope of delivery	• EPSU2-R AC/DC converter without batteries • Operating instructions • Network connection cable from ECR to HiPath 3500 or HiPath 3300: C39195-Z7001-C14
AC power	100 - 240 V ac
Frequency range	47 to 63 Hz
Connected output	200 W
Output power consumption/nominal output	140 W
Mains/nominal voltage	54.2 V
UPS batteries	V39113-W5123-E891 Batteries are not included in the scope of supply and must be ordered separately.

2.9.7 Expansion Cabinet Rack ECR

When installing the system, an ECR in the 19” cabinet is required if

- emergency battery operation is necessary during a power failure or if the system requires uninterruptible power.
  The necessary batteries are installed in the ECR.
- the internal system power supply unit for HiPath 3500 or HiPath 3300 is not sufficient enough to provide power to the overall telephone configuration (corded or cordless telephones).
  In this case, the EPSU2-R external power supply unit should be installed in the ECR.

There are switches for the line and battery voltage on the front panel as well as a fuse for protecting the battery circuit.

The jacks for the line and battery voltage are located on the rear of the housing. The line voltage is only fed through and can be interrupted using a switch.

2.10 HiPath 3300

2.10.1 Hardware Overview

Structure

The HiPath 3300 housing intended for use with 19’ cabinets contains three slot levels with the following assignments:

- Slot level 1: slide-in shelves for two peripheral boards
- Slot level 2: slide-in shelf for CBRC control board
- Slot level 3: optional boards (up to 3 modules)

The power supply unit is located on the back of the subrack.

The connection to peripherals (telephones, trunks, and others) is set up using MW8 jacks in the front panels of the boards.

Dimensions and Slots

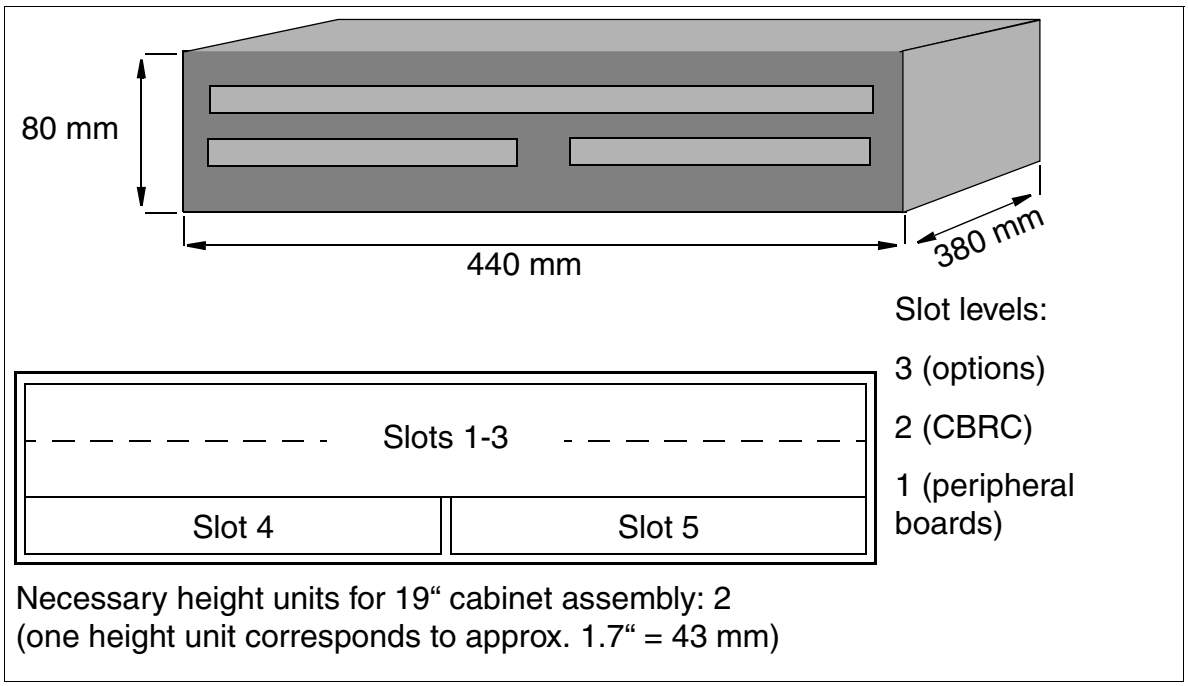


Figure 2-24 Dimensions and Slots in HiPath 3300

2.10.2 Static Traffic Capacity

The HiPath 3300 system has the following static traffic capacities.

Table 2-44 HiPath 3300 - Static Traffic Capacity

System	Slots	Static Traffic Capacity	Total static traffic capacity of the system
HiPath 3300 (see Figure 2-24)	2 / 3 (CBRC)	24 erlangs	56 erlangs
	4	16 erlangs	
	5	16 erlangs	

2.10.3 Central Components

2.10.3.1 CBRC

Introduction

The CBRC (**C**entral **B**oard **R**ack with **C**oldfire **C**om) board performs all central control and switching functions for HiPath 3300.

Subboards

The following subboards (some of which are optional) can be used depending on the application:

- CMS clock module small
  - supports all two-channel cordless connections to the HiPath 3550, HiPath 3350, HiPath 3500 and HiPath 3300 systems.
  - provides the master clock for digital networking.

  Section 2.11 contains additional information on when CMS is used.
- ADPCM (CMA) clock module
  - supports the 4-channel CMI connection over BS3/1 to the HiPath 3550, HiPath 3350, HiPath 3500 and HiPath 3300 systems.
  - in the same way as the CMS clock module small, provides the master clock for digital networking.

  Section 2.11 contains additional information on when CMA is used.
- MMC multimedia card
  This plug-in memory card contains the CDB backup and the version-specific APS. Please note that the MMC may only be replaced by a multimedia card approved by Siemens AG. Cards that have not been approved may have a different internal structure which can affect temporal access and certain features (for example, CDB backup and APS transfer).
- IMODN Integrated Modem Card New
  This plug-in card allows remote service (analog mode up to 33.6 Kbps), without having to use an external modem.
- LIM LAN interface module
  This subboard makes available an Ethernet (10BaseT/10 Mbps) LAN connection using an 8-pin RJ45 jack (see Section 2.10.3.3).
- MPPI (music on hold)

Interfaces

- Eight $U_{P0/E}$ (digital subscriber line interfaces)
  Up to three BS3/1 base stations can be connected directly for HiPath Cordless Office.
- Four T/Rs (analog subscriber line interfaces)
- Two S_0 interfaces (trunk or subscriber or fixed connection)
- One V.24 interface

2.10.3.2 UPSC-DR

Introduction

This board combines the power supply and battery management functions. No other components are required if operated as a power supply. To maintain short-term battery emergency operation after a power failure, that is, to use uninterruptible power supply functions, you must also connect a battery pack.

Technical specifications

- Nominal voltage range: 100 Vac - 240 Vac
- Nominal frequency: 50 Hz - 60 Hz
- Ring generator: 75 Vac, 20/25/50 Hz
- Partial voltages: +5 Vdc, –48 V
- Battery charger: 4 x 12 V (40.8 V-55.2 V)
- Power consumption: approx. 90 W

- Bridging times
  The following table lists the maximum bridging times (battery operation in case of power failure) available with four batteries V39113-W5123-E891 (4 x 12 V/7 Ah batteries).

  Table 2-45 UPSC-DR - Bridging Times with four Batteries V39113-W5123-E891 (4 x 12 V/7 Ah Batteries)

System	Power supply unit	Load levels	Maximum bridging time
HiPath 3300	UPSC-DR	Normal output load = 5 V/3 A; –48 V/0.5 A; ringing approx. 2 VA	7h 30min
Measurement conditions: • All measurements were performed at a room temperature of approximately 23 °C (73.4 °F). • The batteries were fully charged when the measurement was started.			

2.10.3.3 LIM

The **L**AN **I**nterface **M**odule (LIM - S30807-Q6930-X) is an optional plug-in card for all HiPath 3000 central control boards (see also Section 4.4).

The board provides an Ethernet (10BaseT/10 Mbps) LAN connection via an 8-pin RJ45 jack.

The LIM module can be used for administration via HiPath 3000 Manager E and for CTI functions (TAPI 120 V2.0). However, bear in mind that the number of BHCAs (Busy Hour Call Attempts = number of connection attempts during busy traffic hours) is restricted to 400 at a maximum of six TAPI ports. The use of "power dialers" is not approved.

You cannot operate the LIM module and a HG 1500 board simultaneously in one system.

2.10.4 Peripheral Components

2.10.4.1 Subscriber Line Modules

Table 2-46 Subscriber Line Modules for HiPath 3300

Board Name	Capacity			Country		Type/Description
	Ports per board	B channels per board	Max. number of boards per system	ROW	U.S.	
8SLAR	8		2	x	x	Board for connecting analog stations (a/b, T/R)
HXGR3	2	8	1 (2[1])	x	x	HG 1500 board for the direct connection of IP workpoint clients.
IVMP8R	8	8	1	x	x	These boards are for the integrated voicemail functions of HiPath Xpressions Compact.
IVMS8R	8	8	1	x	x	
SLU8R	8	16	2	x	x	Board for connecting optiPoint 500 and optiset E telephones ($U_{P0/E}$)
STLS4R	4	8	2	x	x	Board for ISDN basic rate access. Configuration of ISDN trunks, tie trunks, and stations (no feeding) on the same board is possible.

1 The system may be configured with two HG 1500 boards if PDM1 is not used.

2.10.4.2 Trunk Boards

Table 2-47 Trunk Boards for HiPath 3300

Board Name	Capacity			Country		Type/Description
	Ports per board	B channels per board	Max. number of boards per system	ROW	U.S.	
TLA4R	4		2	x	-	Trunk board for analog lines including ALUM and call metering receiving equipment board
TMGL4R	4		2	-	x	Trunk board for analog lines
STLS4R	4	8	2	x	x	Board for ISDN basic access. Permits configuration of ISDN trunks, tie trunks, and subscribers (no feeding) on the same board.

2.10.4.3 Boards for Tie Trunk Traffic

Table 2-48 Tie Trunk Traffic Boards for HiPath 3300

Board Name	Capacity			Country		Type/Description
	Ports per board	B channels per board	Max. number of boards per system	ROW	U.S.	
HXGR3	2	8	1 (2[1])	x	x	HG 1500 board for connecting the HiPath 3300 system directly to a local data network (Ethernet).

1 The system may be configured with two HG 1500 boards if PDM1 is not used.

2.10.4.4 Options

Table 2-49 Optional Boards for HiPath 3300

Board Name	Capacity		Country		Type/Description
			ROW	U.S.	
ANI4R	Analog trunks	4	-	x	This board allows calling line identification (caller ID) in conjunction with TMGL4R.
EXMR			x	x	External music on hold
MPPI			x	-	Music on hold (MOH)
UAMR			x	-	Announcement before answering/music on hold/relay/ sensor
STRBR	Sensors	4	x	x	Control relay module; provides 4 relays and 4 sensors for controlling external devices or detecting external control events.
	Relay	4			

2.10.5 Additional System Data

2.10.5.1 Heat Dissipation and Power Consumption

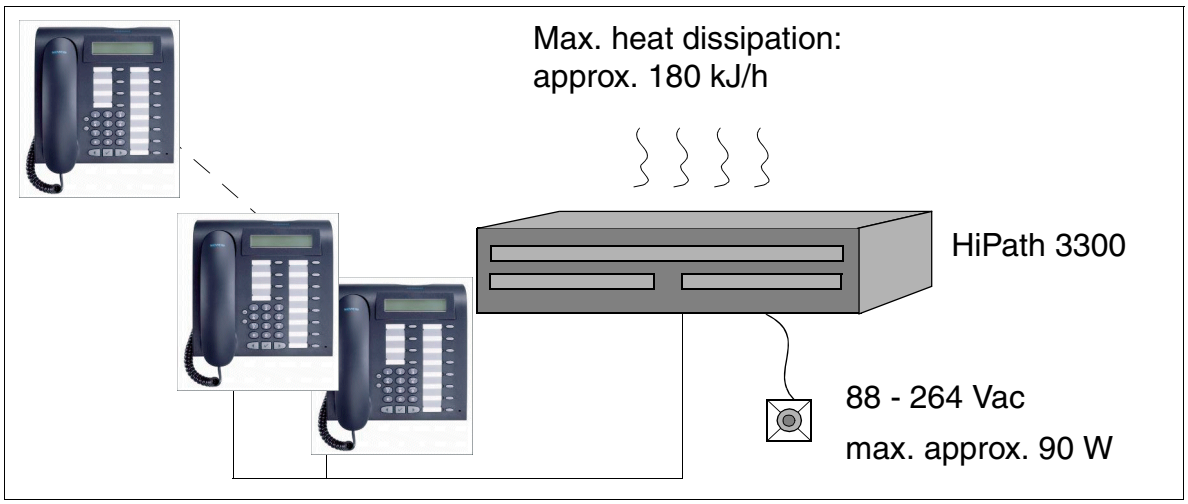


Figure 2-25 Heat Dissipation and Power Consumption in a HiPath 3300

Appendix A, “Identifying System Power Requirement” contains information on the power requirements of individual boards and components.

2.10.5.2 Specifications for the Uninterruptible Power Supply

Refer to Section 2.10.3.2 for details on the UPSC-DR.

2.10.6 Expansion Cabinet Rack ECR

When installing the system, an ECR in the 19” cabinet is required if

- emergency battery operation is necessary during a power failure or if the system requires uninterruptible power.
  The necessary batteries are installed in the ECR.
- the internal system power supply unit for HiPath 3500 or HiPath 3300 is not sufficient enough to provide power to the overall telephone configuration (corded or cordless telephones).
  In this case, the EPSU2-R external power supply unit should be installed in the ECR.

There are switches for the line and battery voltage on the front panel as well as a fuse for protecting the battery circuit.

The jacks for the line and battery voltage are located on the rear of the housing. The line voltage is only fed through and can be interrupted using a switch.

2.11 Recommendations for CMA and CMS Utilization

One of the following optional subboards can be used for advanced clock accuracy:

- **C**lock **M**odule **S**mall CMS (S30807-Q6928-X) for all HiPath 3000 central control boards.
- **C**lock **M**odule **A**DPCM CMA (S30807-Q6931-X) for the CBCC and CBRC central control boards.

Table 2-50 provides recommendations for the implementation of CMA and CMS subboards based on

- the type of network (ISDN S_0, ISDN S_{2M} or Ethernet/IP (10/100 BaseT))
- the trunk connection available (no trunk/analog trunk, ISDN S_0 or ISDN S_{2M}) and consequently, the possible provision of a digital reference clock.
- HiPath Cordless Office.

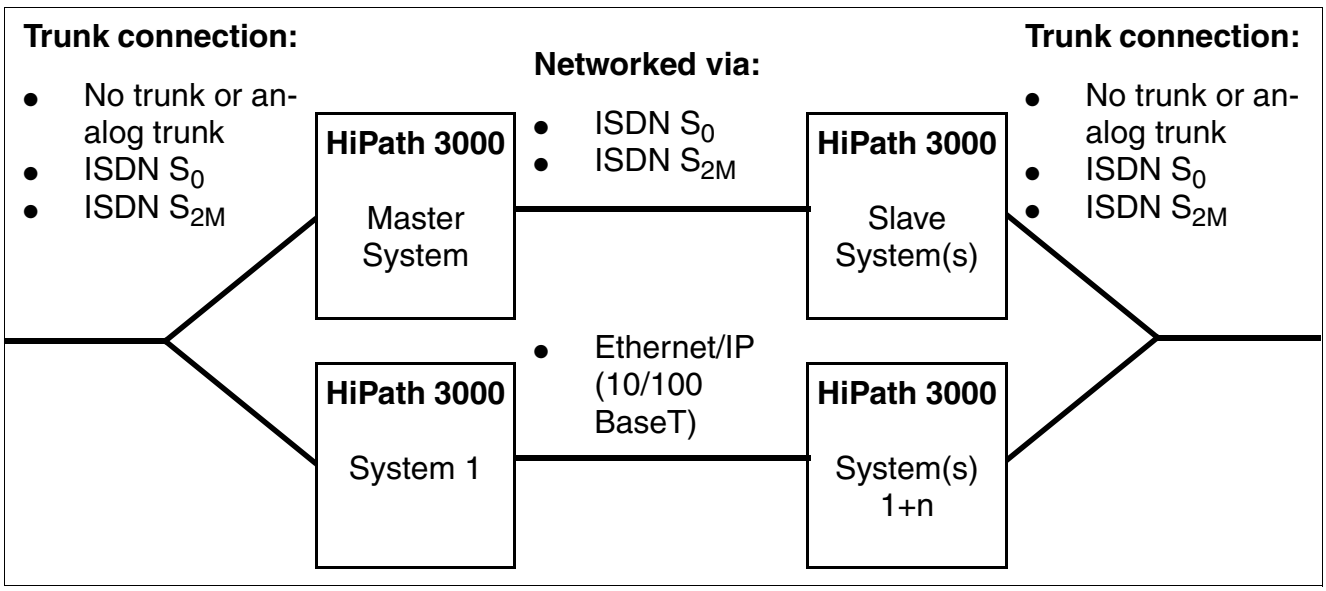


Figure 2-26 Networking Options for HiPath 3000 Systems

Table 2-50 Recommendations for CMA and CMS Utilization

Trunk connection	Reference clock	HiPath Cordless Office		Trunk connection	Reference clock	HiPath Cordless Office	
		No	Yes			No	Yes
• **Networking via ISDN S_0 lines:**							
MASTER system				**SLAVE system(s)**			
No trunk/ analog trunk	–	–	CMS/CMA (see Table 2-51)	No trunk/ analog trunk	Via ISDN S_0 networking line	–	CMA[2]
ISDN S_0 (not always active)	Via ISDN S_0 trunk connection (if active)	CMS[1]	CMS/CMA (see Table 2-51)	ISDN S_0 (not always active)	Via ISDN S_0 networking line	–	CMA[2]
ISDN S_0 (always active)	Via ISDN S_0 trunk connection	CMS[1]	CMA[2]	ISDN S_0 (always active)	Via ISDN S_0 trunk connection	–	CMA[2]
ISDN S_{2M}	Via ISDN S_{2M} trunk connection	CMS[1]	CMA[2]	ISDN S_{2M}	Via ISDN S_{2M} trunk connection	–	CMA[2]

Table 2-50 Recommendations for CMA and CMS Utilization

Trunk connection	Reference clock	HiPath Cordless Office		Trunk connection	Reference clock	HiPath Cordless Office	
		No	Yes			No	Yes
• **Networking via ISDN S_{2M} lines:**							
MASTER system				**SLAVE system(s)**			
No trunk/ analog trunk	–	–	CMS/CMA (see Table 2-51)	No trunk/ analog trunk	Via ISDN S_{2M} networking line	–	CMA[2]
ISDN S_0 (not always active)	Via ISDN S_0 trunk connection (if active)	CMS[1]	CMS/CMA (see Table 2-51)	ISDN S_0 (not always active)	Via ISDN S_{2M} networking line	–	CMA[2]
ISDN S_0 (always active)	Via ISDN S_0 trunk connection	CMS[1]	CMA[2]	ISDN S_0 (always active)	Via ISDN S_0 trunk connection	–	CMA[2]
ISDN S_{2M}	Via ISDN S_{2M} trunk connection	CMS[1]	CMA[2]	ISDN S_{2M}	Via ISDN S_{2M} trunk connection	–	CMA[2]

Table 2-50 Recommendations for CMA and CMS Utilization

Trunk connection	Reference clock	HiPath Cordless Office		Trunk connection	Reference clock	HiPath Cordless Office	
		No	Yes			No	Yes
• **Networking via Ethernet/IP (10/100 BaseT) lines:**							
System 1				**System(s) n+1**			
No trunk/ analog trunk	–	CMS[3]	CMS/CMA (see Table 2-51)	No trunk/ analog trunk	–	CMS[3]	CMS/CMA (see Table 2-51)
ISDN S_0 (not always active)	Via ISDN S_0 trunk connection (if active)	CMS[3]	CMS/CMA (see Table 2-51)	ISDN S_0 (not always active)	Via ISDN S_0 trunk connection (if active)	CMS[3]	CMS/CMA (see Table 2-51)
ISDN S_0 (always active)	Via ISDN S_0 trunk connection	–	CMA[2]	ISDN S_0 (always active)	Via ISDN S_0 trunk connection	–	CMA[2]
ISDN S_{2M}	Via ISDN S_{2M} trunk connection	–	CMA[2]	ISDN S_{2M}	Via ISDN S_{2M} trunk connection	–	CMA[2]

1 CMS is not necessary if the reference clock supplied by the CO is **always** available via the networking lines (not a transparent clock).

2 CMA is not necessary if ADPCM conversion is not needed for HiPath Cordless Office (see Table 2-51).

3 CMS is not necessary but is recommended for the following reasons: Although an Ethernet link is an asynchronous connection, buffer overflow/underflow can cause transmission errors. To avoid this, the clock difference between the master and the slave systems should be as small as possible so that the receive and send buffer can be read and addressed at the same speed on both sides. The more accurate the clock source in the relevant systems, the fewer the faults.

2.12 HiPath Cordless Office

2.12.1 Introduction

For Version 1.2 and later of HiPath 3000, HiPath Cordless Office can be used on all systems of this product line.

Direct connection

The BS3/1 (S30807-H5482-X) and BS4 (S30807-U5491-X) base stations can be connected directly to the $U_{P0/E}$ interfaces on the central control boards in the HiPath 3550, HiPath 3350, HiPath 3500, and HiPath 3300. The connection must be made via one $U_{P0/E}$ interface each. A mix of base stations of types BS3/1 and BS4 is supported.

To ensure the operation of a maximum of one base station on the central control board's $U_{P0/E}$ interfaces of the HiPath 3550, HiPath 3350, HiPath 3500, and HiPath 3300, a BS3/S (X30807-X5482-X100) single-cell base station can be used. In this case, it is not possible to expand with additional base stations.

However, base stations cannot be simultaneously connected to the SLC16/SLC16N board and the CBCC within one HiPath 3550 system.

Connecting cordless boards

Base stations can be connected to the $U_{P0/E}$ interfaces of the following cordless boards:

- SLC16 (not BS4) and SLC16N with HiPath 3750, HiPath 3550, and HiPath 3700.
- SLCN in HiPath 3800

A mix of base stations of types BS2/2 (S30807-H5471-X200), BS3/1 (S30807-H5482-X), BS3/3 (S30807-H5485-X) and BS4 (S30807-U5491-X) may be used on the above cordless boards.

You can install up to four SLC16 or SLC16N boards in HiPath 3750 and HiPath 3700 and up to four SLCN boards in HiPath 3800. All four boards provide full cordless functionality (roaming and seamless connection handover) because the radio fields on the cordless boards are synchronized within a single system (see Section 2.12.3).

SLC16 and SLC16N can be used in mixed mode within a HiPath 3750 and HiPath 3700.

The HiPath 3000 product line does not currently support the network-wide handover feature.

2.12.2 System Configuration

The following table indicates the maximum possible system configuration parameters for the HiPath Cordless Office. It also shows when

- CMA or CMS is necessary.
- an analog trunk access is possible.

Table 2-51 HiPath Cordless Office - System Configuration for HiPath 3000 V5.0

System	Max. no.			Clock modules	Maximum number of base stations BS with connection via 1x$U_{P0/E}$					Simultaneous calls per BS					Max. no. MTs	Analog trunk access of the system
	SLC16	SLC16N	SLCN		BS3/1	BS3/S	BS2/2	BS3/3	BS4	BS3/1	BS3/S	BS2/2	BS3/3	BS4		
HiPath 3350 HiPath 3300	–	–	–	CMS	–	1	–	–	–	–	2	–	–	–	8	No
	–	–	–	CMA	–	1	–	–	–	–	4	–	–	–	8	Yes
	–	–	–	CMA	3	–	–	–	3	4	–	–	–	4	16	Yes
HiPath 3550 HiPath 3500	–	–	–	CMS	–	1	–	–	–	–	2	–	–	–	8	No
	–	–	–	CMA	–	1	–	–	–	–	4	–	–	–	8	Yes
	–	–	–	CMA	7	–	–	–	7	4	–	–	–	4	32	Yes
HiPath 3550	1	1	–	CMS	16	–	8	8	16	4	–	8	12	12	64	Yes
HiPath 3750 HiPath 3700	4	4	–	CMS	64	–	32	32	64[1]	4	–	8	12	12	250 (with 4 SLC16/ SLC16N)[2]	Yes
HiPath 3800	–	–	4	CMS	64	–	32	32	64	4	–	8	12	12	250 (with 4 SLCN)[3]	Yes

Comments:

- BS2/2 (S30807-H5471-X200) is a base station that supports a maximum of 8 calls when connected using two $U_{P0/E}$ interfaces.
- BS3/1 (S30807-H5482-X) is a base station that supports a maximum of 4 calls.
- BS3/3 (S30807-H5485-X): is a base station that supports a maximum of 12 calls when connected using three $U_{P0/E}$ interfaces.
- BS3/S (X30807-X5482-X100): The BS3/S single-cell base station guarantees the operation of a maximum of one base station on the $U_{P0/E}$ interfaces of the central board. It is not possible to operate additional base stations.
- BS4 (S30807-U5491-X): is a base station that supports a maximum of 12 calls when connected using three $U_{P0/E}$ interfaces. In the case of a direct connection, it is only permitted to make the connection via one $U_{P0/E}$ interface. The B channels in the base station BS4 require a license.
  Connection to SLC16 is not possible.

1 Connection is only possible with SLC16N.
2 Up to 128 handsets are possible at an SLC16 or SLC16N.
3 Up to 128 MTs are possible at an SLCN.

2.12.3 Multi-SLC and Cross-System Networking

Multi-SLC (HiPath 3800, HiPath 3750, HiPath 3700) and system-wide networking (HiPath 3800, HiPath 3750, HiPath 3550, HiPath 3350, HiPath 3700, HiPath 3500, HiPath 3300)

You can install up to four SLC16 or SLC16N boards in HiPath 3750 and HiPath 3700 and up to four SLCN boards in HiPath 3800. For the total cordless station mobility (roaming and seamless connection handover) within a system, the radio fields of these cordless boards are synchronized.

The system treats every handset (mobile station) as a corded device. During administration, a fixed port on the system's "home cordless board" is assigned to the MT; this is used for addressing the MT.

As soon as an MT moves into the area of a different radio switching location ("current-location cordless board"), an extension connection is switched using a DSS1 connection initiated by the cordless board. The home and current-location cordless boards exchange a networking protocol (User-to-User Signaling UUS) over this extension connection to support full mobility (see Figure 2-27).

This function can be used not only within one system, but also among systems (among nodes) because the CorNet NQ used for networking supports the UUS protocol (note: for the system-wide extension connections, you may have to take additional B channels into consideration for the permanent connection paths (CorNet NQ, see Section 2.12.4). Full mobility is guaranteed across the various cordless system hops. All handset features (callback, team functions, voicemail, etc.) remain intact. The network-wide handover feature is only exception here as it is not currently supported.

Required B channels

Table 2-52 Required B Channels for Multi-SLC and System-Wide Networking

Mobile telephone (MT) has set up a connection	Required B channels	Required B channels for the home cordless board	Required B channels for the current-location cordless board
In the home cordless board range	1	1	–
In the current-location Cordless board range	3	2	1
Handover from home to home cordless board	1	1	–
Handover from home to current-location cordless board	3	2	1

Table 2-52 Required B Channels for Multi-SLC and System-Wide Networking

Mobile telephone (MT) has set up a connection	Required B channels	Required B channels for the home cordless board	Required B channels for the current-location cordless board
Handover from current-location to current-location cordless board	5 (temporary)	3	2 (1 for each cordless board)

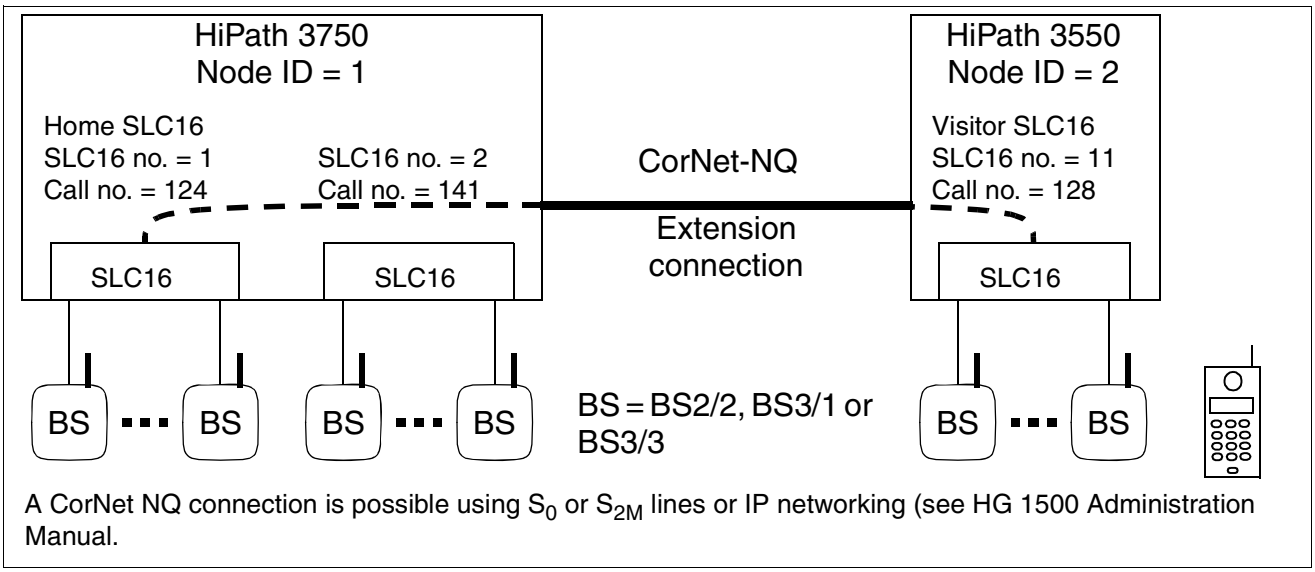


Figure 2-27 Example of an SLC16 Extended Connection in Networked Systems

Networked HiPath 3000 systems feature

- max. 64 networked systems
- accessible using a common station number (roaming among the systems/nodes)
- call interruption when changing between systems/nodes

2.12.4 Planning HiPath 3000 System Networks with Network-Wide Roaming

The demand for additional B channels for fixed connection paths (CorNet NQ) must be taken into account for the system-wide extension connections described in Section 2.12.3.

If using the "network-wide roaming" feature, you must make sure that different systems with identical DECT IDs do not have overlapping radio ranges. Handsets treat networked systems with identical DECT IDs as a single system.

When hops overlap in systems with identical DECT IDs, handsets start to perform unintentional network-wide handover attempts which result in call cleardown.

If networking is required for systems in which the individual radio fields overlap (for example, to increase capacity limits or through decentralized installation), different DECT IDs must be configured in the individual systems. The network-wide roaming feature is not supported in this case.

The following diagrams show three different showing HiPath 3000 system networking scenarios.

Scenario 1: Incorrect DECT Configuration of Networked HiPath 3000 Systems

Identical DECT IDs and overlapping radio areas result in incorrect handover causing a breakdown in communication.

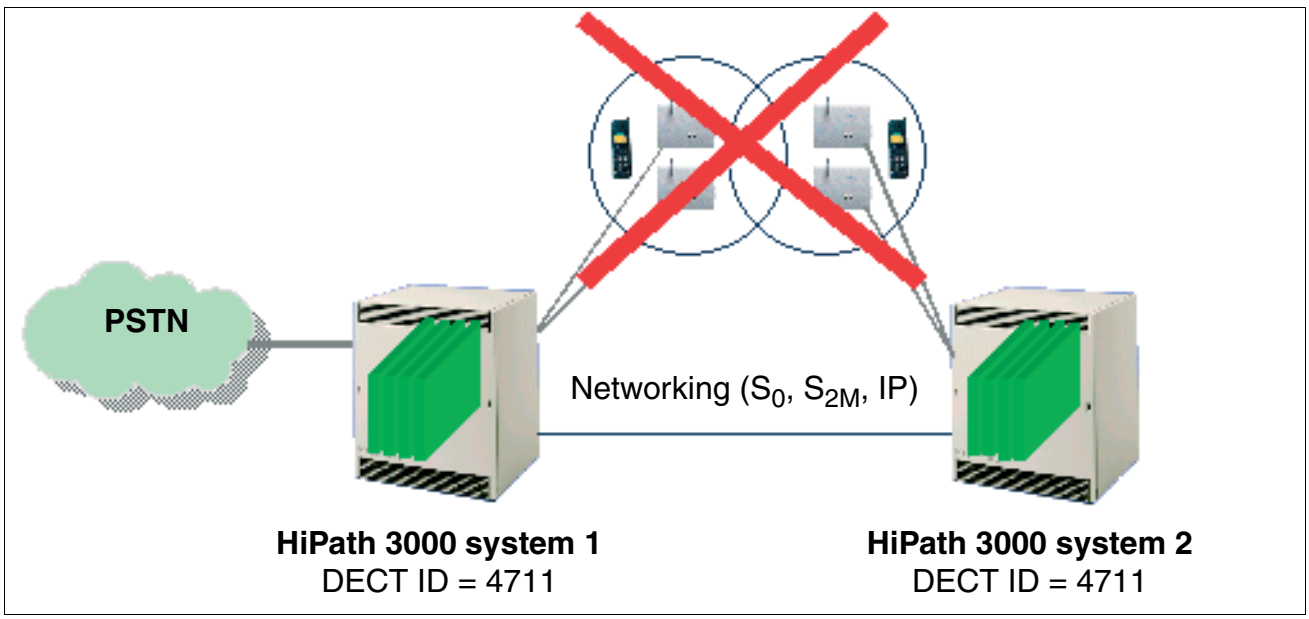


Figure 2-28 Incorrect DECT Configuration of Networked HiPath 3000 Systems

Scenario 2: Correct DECT configuration of networked HiPath 3000 systems

Handover works properly because DECT IDs are not identical even though the hops overlap. Disadvantage: No network-wide roaming.

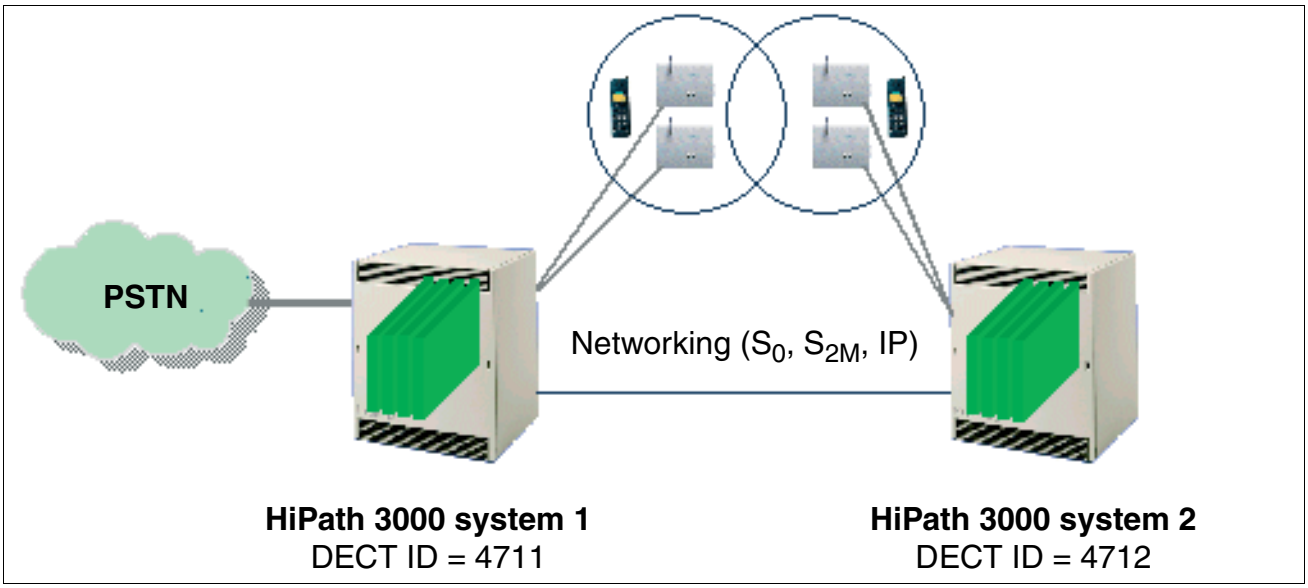


Figure 2-29 Correct DECT configuration of networked HiPath 3000 systems

Scenario 3: Correct DECT configuration of networked HiPath 3000 systems

Despite identical DECT IDs, handover works properly because the hops do not overlap. Network-wide roaming is possible.

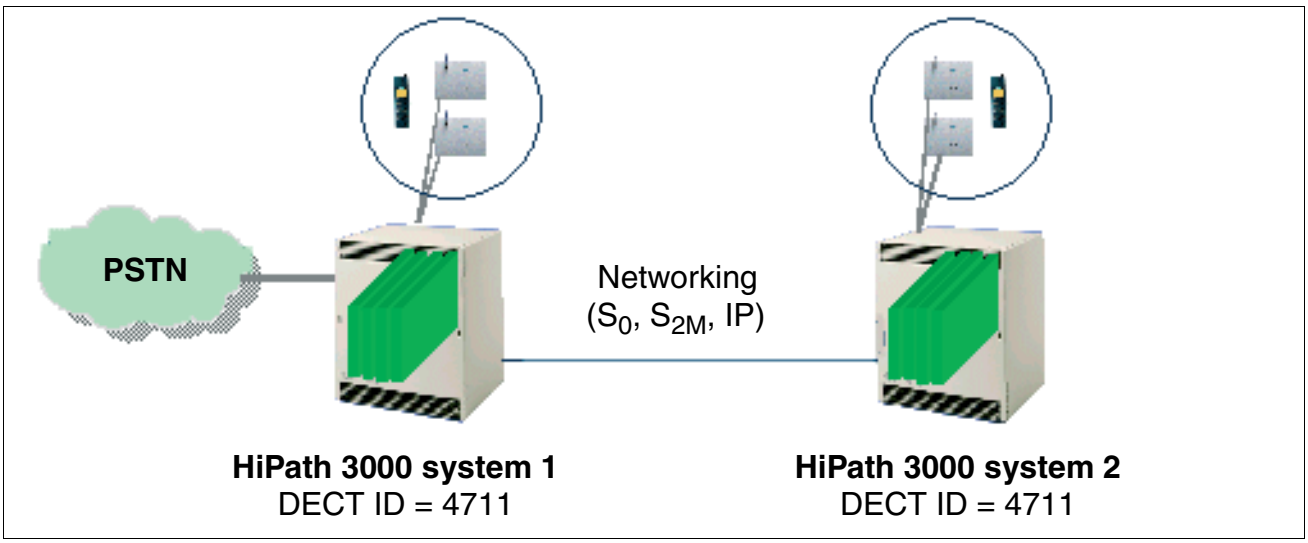


Figure 2-30 Correct DECT configuration of networked HiPath 3000 systems

2.12.5 Components of HiPath Cordless Office

2.12.5.1 Mobile Telephones

The mobile telephones in the Gigaset series can be used from 2000.

2.12.5.2 Base stations

Types

- BS3/1 (S30807-H5482-X) is a base station that supports a maximum of four calls simultaneously.
- BS2/2 (S30807-H5471-X200) Up to 8 calls can be made simultaneously if the connection uses two UP0/E interfaces (upgrades only).
- BS3/3 (S30807-H5485-X) The base station can only be operated on the SLC16 or SLC16N board. The connection via at least two $U_{P0/E}$ interfaces is essential. It supports a maximum of 12 calls when connected using three $U_{P0/E}$ interfaces.
- BS3/S (X30807-X5482-X100): The BS3/S single-cell base station guarantees the operation of a maximum of one base station on the $U_{P0/E}$ interfaces of the central board. It is not possible to operate additional base stations.
- BS4 (S30807-U5491-X): is a base station that supports a maximum of 12 calls when connected using three $U_{P0/E}$ interfaces. In the case of a direct connection, it is only permitted to make the connection via one $U_{P0/E}$ interface. The B channels in the base station BS4 require a license.
  Connection to SLC16 is not possible.

Technical specifications

Table 2-53 Technical Data for Various Base Stations

Parameter	BS3/1 and BS3/S	BS3/3	BS4	Outdoor cover
Power supply voltage range	42 to 54 V	42 to 54 V	42 to 54 V	–
Power consumption	max. 1.7 W	max. 3.2 W	max. 3.0 W	–
Housing dimensions (W x D x H in mm)	181 x 139 x 69	202 x 172 x 43	200 x 176 x 49	296 x 256 x 90
Weight	approx. 0.3 kg	approx. 0.5 kg	approx. 0.5 kg	approx. 1.0 kg
Temperature range	for indoor use: – 5 to + 50 °C			for outdoor use: – 20 to + 45 °C
Relative humidity	–	–	–	up to 95 %

2.13 Technical Specifications HiPath 3000

Table 2-54 Technical Specifications HiPath 3000

Maximum System Values	HiPath 3800	HiPath 3750	HiPath 3550	HiPath 3350	HiPath 3700	HiPath 3500	HiPath 3300
Ringer Equivalence Number (type plate)	Basic cabinet = 6 A / 110 Vac, 3 A / 230 Vac Expansion cabinet = 8 A / 110 Vac, 4 A / 230 Vac	5.4/2.7 A / 115 – 230 Vac	2.6 A / 115 – 230 Vac	1.3 A / 115 – 230 Vac	5.4/2.7 A / 115 – 230 Vac	2.6 A / 115 – 230 Vac	1.3 A / 115 – 230 Vac
AC line frequency	50 - 60 Hz						
Dimensions (height x width x depth in mm)	490 x 440 x 430	490 x 410 x 390	450 x 460 x 200	450 x 460 x 128	490 x 410 x 390	155 x 440 x 380	88 x 440 x 380
Height units for 19“ cabinet assembly	11	–	–	–	11	4	2
Weight	Basic cabinet = 16.5 kg Expansion cabinet = 15.0 kg (transport weight, including backplane and cabinet feet)	22 kg (per fully equipped cabinet)	8 kg	6 kg	22 kg (per fully equipped cabinet)	8 kg	6 kg
					Expansion cabinet ECR (not for U.S. and Canada): • 6.5 kg (14.32 lb) without batteries • 17.5 kg (38.54 lb) with batteries		

2.14 Interfaces

Interfaces for stations

Subscriber line	Interface	Connection	Protocol
Digital	$U_{PO/E}$ (2-channel)	optiPoint 500/600 and optiset E telephones with adapters or $U_{P0/E}$ card	CorNet-TS
Analog	T/R	Analog telephones, group 2, 3 fax, Vtx, voice mail, data via V.24 adapter (modem), announcement devices, MOH	DTMF DP
Cordless	$U_{P0/E}$	CMI base station	CorNet-TR
Digital (ISDN)	S_0 (2-channel)	S_0 PC card, group 4 fax, telephones (no feeding)	DSS1

Interfaces for trunk traffic and tie traffic

Trunk/ Tie Traffic	Interface	Connection	Protocol
Digital	$S_{2M\ FV}$ (30-channel) (FV = dedicated line)	ISDN trunk Tie trunk networking	DSS1 CorNet N CorNet-NQ QSig
Digital	$S_{0\ FV}$ (2-channel) (FV = dedicated line)	ISDN trunk Tie trunk networking	DSS1 CorNet N CorNet-NQ QSig
Analog	LS	Analog trunk, PSE	DTMF/DP
Analog	E&M	Analog tie trunk	DTMF/DP
IP	LAN	10BaseT 10/100	TCP/IP

Interfaces for options

Option	Interface	Connection	Protocol
Profi-PSE	ESPA	PSE	
Announcement before answering	T/R E&M	Announcement device without start/stop control or with start/stop control	
V.24/CSTA	V.24	Service PC (first V.24 (RS-232) interface), applications (CSTA) or call detail printer/call charge computer (second V.24 (RS-232) interface)	
optiClient Attendant	$U_{P0/E}$, IP	optiClient Attendant via control adapter, USB, IP	CorNet-TS, IP
Floating contacts	Relay	Door opener, messenger call, and others, 4 floating contacts	
ALUM	Relay	Analog power failure transfer for 4 trunks	

2.15 Interface-to-Interface Ranges

Telephone interface-to-interface ranges (with J-Y (ST) 2x2x0.6, 0.6 mm diameter)

Table 2-55 Telephone Interface-to-Interface Ranges (with (ST) 2x2x0.6, 0.6 mm diameter)

Telephone Interfaces	Range in m	Loop Resistance in Ohms
ISDN S_0 layer 1 point-to-point connection	< 600	156
ISDN S_0 extended bus connection	< 400	104
ISDN S_0 bus connection[1]	< 80 for the HiPath 3800 board STMD3 (Q2217) < 120 for all other S_0 boards	21
ISDN-S_0 wall outlet to terminal	< 10	–
Analog users	< 2000	520
$U_{P0/E}$ exchange to primary telephone	< 1000	230
$U_{P0/E}$ primary to secondary telephone	< 100	23

1 Board-specific

Trunk connection and CorNet N/CorNet NQ ranges

The table below provides the maximum cable lengths for direct trunk connection and direct CorNet N/CorNet NQ wiring. The values apply to ideal conditions, which means there can be no joints, etc. The real conditions must be measured on-site.

Table 2-56 Cable Lengths for Trunk Connection and Direct CorNet N/CorNet NQ Direct Wiring

Interface	Cable	Diameter	Attenuation per km	Max. cable length
S_0	ICCS cable J-2Y(ST)Y4x2x0.51 LG ICCS Data5	0.51 mm	7.5 dB at 96 kHz	800 m
	Installation cable J-2Y(ST)Y ≥ 10x2x0.6 ST III BD	0.6 mm	6.0 dB at 96 kHz	1000 m
S_{2M}	A-2Y0F(L)2Y ≥ 10x2x0.6 (full PE insulation, filled)	0.6 mm	17 dB at 1 MHz	350 m

2.16 Numbering plan

HiPath 3000/HiPath 5000 provide one default numbering plan for users.

Table 2-57 Default Numbers for HiPath 3000/HiPath 5000 V5.0

Type of numbers	Default numbers				
	HiPath 3800	**HiPath 3750 HiPath 3700**	**HiPath 3550 HiPath 3500**	**HiPath 3350 HiPath 3300**	**HiPath ComScendo Service**
Station numbers	100-749	100-749	100-287 500-687	11-30 51-70	1000-1999
Station extension numbers	100-749	100-749	100-287 500-687	11-30 51-70	1000-1999
Trunk numbers	7801-7920	7801-7920	7801-7920	801-816	7801-7920
Route codes (external codes)	0 = ROW 9 = USA	0 = ROW 9 = USA	0 = ROW 9 = USA	0 = ROW 9 = USA	0 = ROW 9 = USA
	80-84 850-859	80-84 850-859	80-84 850-859	82-88	8000-8062
USBS call number internal & extension	891	891	891	891	–
IMOD call number internal & extension	890	890	890	890	–
Digital modem internal & extension	879	879	879	879	–
Group call numbers internal & extension	350-499 8600-8749	350-499 8600-8749	350-499	31-50	3500-4499
Internal attendant code (intercept position)	9 = ROW 0 = USA	9 = ROW 0 = USA	9 = ROW 0 = USA	9 = ROW 0 = USA	9 = ROW 0 = USA
Attendant code extension (intercept position)	0 = ROW – = USA	0 = ROW – = USA	0 = ROW – = USA	0 = ROW – = USA	0 = ROW – = USA
Substitution for "*"	75	75	75	75	75
Substitution for "#"	76	76	76	76	76
Service codes	*xxx #xxx	*xxx #xxx	*xxx #xxx	*xxx #xxx	–

2.17 Technical Specifications and Compliance to HiPath 3000

2.17.1 CE Compliance (not for U.S.)

The systems conform to the following guidelines and standards:

Guideline	Standard
R&TTE Directive 99/5/EEC	• EN 60950-1: 2001 (Safety) • EN61000-6-2 (EMC Immunity Industrial) • EN55024 (EMC Immunity Residential) • ETS 300 329 (DECT Emission/Immunity) • TBR 06, ETS 301489-1/6 (DECT Air Interface)

2.17.2 Compliance with US and Canadian Standards (For U.S. and Canada Only)

Table 2-58 Compliance with US and Canadian Standards (For U.S. and Canada Only)

Category	HiPath 3800	HiPath 3750	HiPath 3550	HiPath 3350
Product security	UL 60950-1 First Edition CAN/CSA C22.2 No. 60950-1-03	UL 60950-1 First Edition CAN/CSA C22.2 No. 60950-1-03	UL 60950-1 First Edition CAN/CSA C22.2 No. 60950-1-03	
FCC Part 15 subpart J	Class A	Class A	Class A	Class B
FCC Part 68 registration	Information not available.	AY3USA-33046-MF-E AY3USA-33047-KF-E	AY3USA–25214–MF–E AY3USA–25215–KF–E	
Industry Canada CS–03 certification	Information not available.	267 9147A	267 8782A	
Ringer Equivalence Number (REN)	Information not available.	1.2	0.4	

2.17.3 SAFETY International

IEC 60950-1, first edition 2001, modified

2.18 Environmental Conditions

2.18.1 Electrical Operating Conditions

- Operating limits
  Room temperature: + 5 ...+ 40 °C (41 ... 104 °F)
  absolute humidity: 2 to 25 g H_2O/m^3
  Relative humidity: 5 - 80%
- System ventilation is by convection. Automatic ventilation is required when using the HG 1500 in HiPath 3550 and HiPath 3350.

Caution
Avoid exposing the system to direct sunlight and heaters (excessive heat may damage the system).
If condensation has formed on a system, do not start up the system until it has thoroughly dried.

2.18.2 Mechanical Operating Conditions

The systems are intended for stationary use.

3 HiPath 5000 System Overview

3.1 Introduction

HiPath 5000 is operated as a central administration unit in an IP network of HiPath 3000 systems. By creating a "Single System Image", all relevant nodes can be centrally administered.

HiPath 5000 is the platform for the central provision of applications, and facilitates the use of these applications by all IP networking stations.

With the HiPath ComScendo service, there is also the option of using an integrated gatekeeper and HiPath ComScendo features for IP workpoint clients. Up to 1000 registered IP workpoint clients and up to 250 CorNet-IP trunks (CorNet-NQ protocol tunnelled in H.323 via annex M1) are also supported here.

The HiPath ComScendo Service is effectively a fully-fledgedHiPath 3000node that is only configured as software on a PC. Apart from TDM-specific features (e.g. the connection of $U_{P0/E}$ stations, trunks and special stations such as door openers, etc.), all V5.0 features are available. The HiPath ComScendo Service is administered via HiPath 3000 Manager E, while the HG 1500 resources are administered via Web-based Management (WBM).

Cross-platform use of HiPath ComScendo features (IP networking), for example in conjunction with HiPath 4000, is implemented via CorNet-IP (CorNet-NQ protocol tunnelled in H.323 via annex M1). HG 1500 in HiPath 3000 and HG3550 V2.0 in HiPath 4000 are prerequisites for IP networking over CorNet IP.

Parts of the following setup for HiPath 5000 are optional and can be installed both on the HiPath 5000 server and on a separate PC.

- Feature Server (central administration service in a HiPath 3000/HiPath 5000 network)
- Presence Manager (service for LED signaling of call processing station statuses and network-wide DSS keys)
- HiPath ComScendo service (gatekeeper and HiPath ComScendo features for IP workpoint clients)
- HiPath 3000 Manager E (MS Windows-based tool for the administration of all service and customer-specific data by Service)
- HiPath 3000 Manager C (MS Windows-based tool for the administration of customer-specific data by the customer)
- HiPath Software Manager (Web-based tool for upgrades (Upgrade Manager for HiPath ComScendo Service and HG 1500) and backups (Backup Manager for HiPath ComScendo Service, HG 1500 and databases))
- Inventory Manager (service for detecting software components installed and system information in a HiPath 3000/HiPath 5000 network)

- Customer License Agent CLA (service for analyzing and decrypting a HiPath License Management license file)
- Central License Manager CLM (CLA front-end for reading in licenses in online and offline mode)
- Personal Call Manager PCM (Web-based application for the configuration and administration of personal call forwarding operations)
- HiPath FM Desktop V3.0 (Java-based application for error signaling)
- GetAccount (application that prepares generated call data records for further processing.)

3.2 Software Structure

Feature server

The Feature Server is an essential component in the HiPath 5000 software architecture and serves as a central point for administration and as a data interface for applications and middleware. In addition, the Feature Server synchronizes the HG 1500 boards with all necessary data for digit analysis in a HiPath 3000/HiPath 5000 network.

The networked HiPath 3000 systems (nodes) are administered over the Feature Server. The HiPath 3000 Manager E administration tool does not communicate with the individual systems but exchanges data with the Feature Server. The Feature Server ensures that the networked HiPath 3000 systems receive synchronized CDB data.

The individual systems are accessed directly by HiPath 3000 Manager E in the course of maintenance and online functions.

HG 1500 boards are still administered on a board-specific basis using Web-based management (WBM).

The Feature Server is an MS Windows service that automatically starts at the same time as the HiPath 5000 server.

Communication with the individual HiPath 3000 systems belonging to the network takes place over their HG 1500 boards.

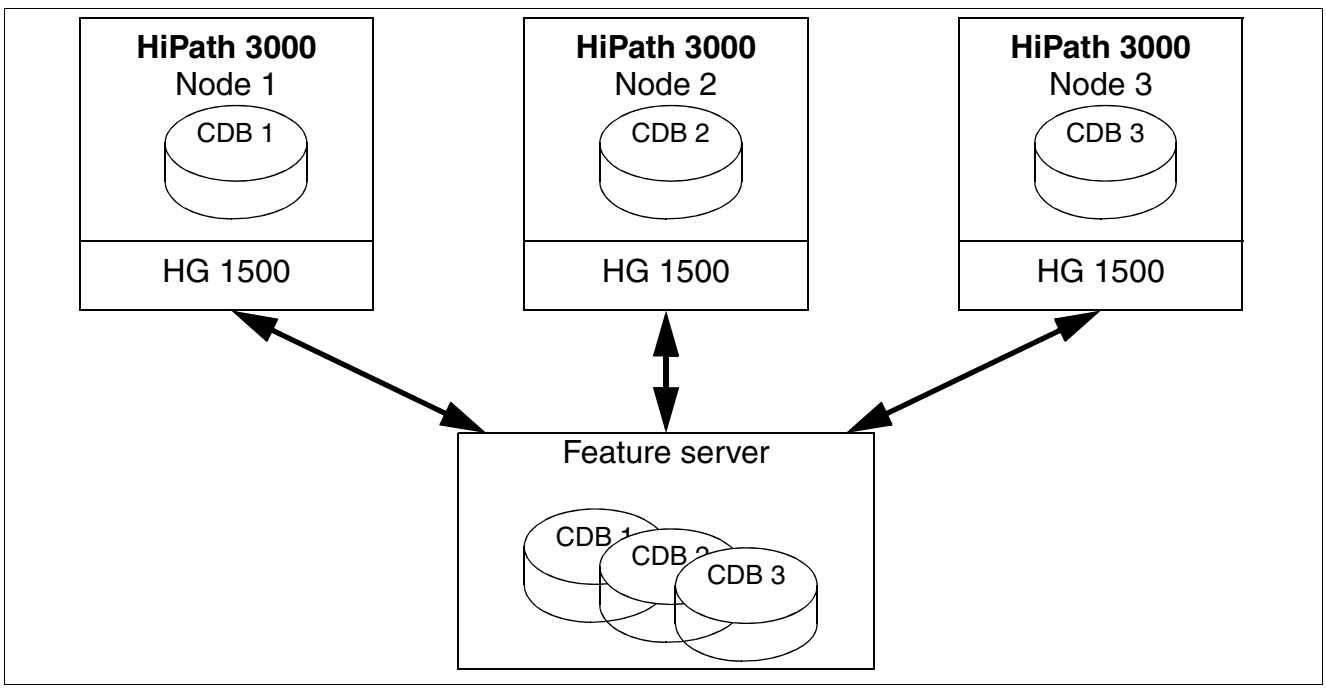


Figure 3-1 Customer Data Exchange Between the Feature Server and Nodes

The following figure shows the services and routines associated with the Feature Server.

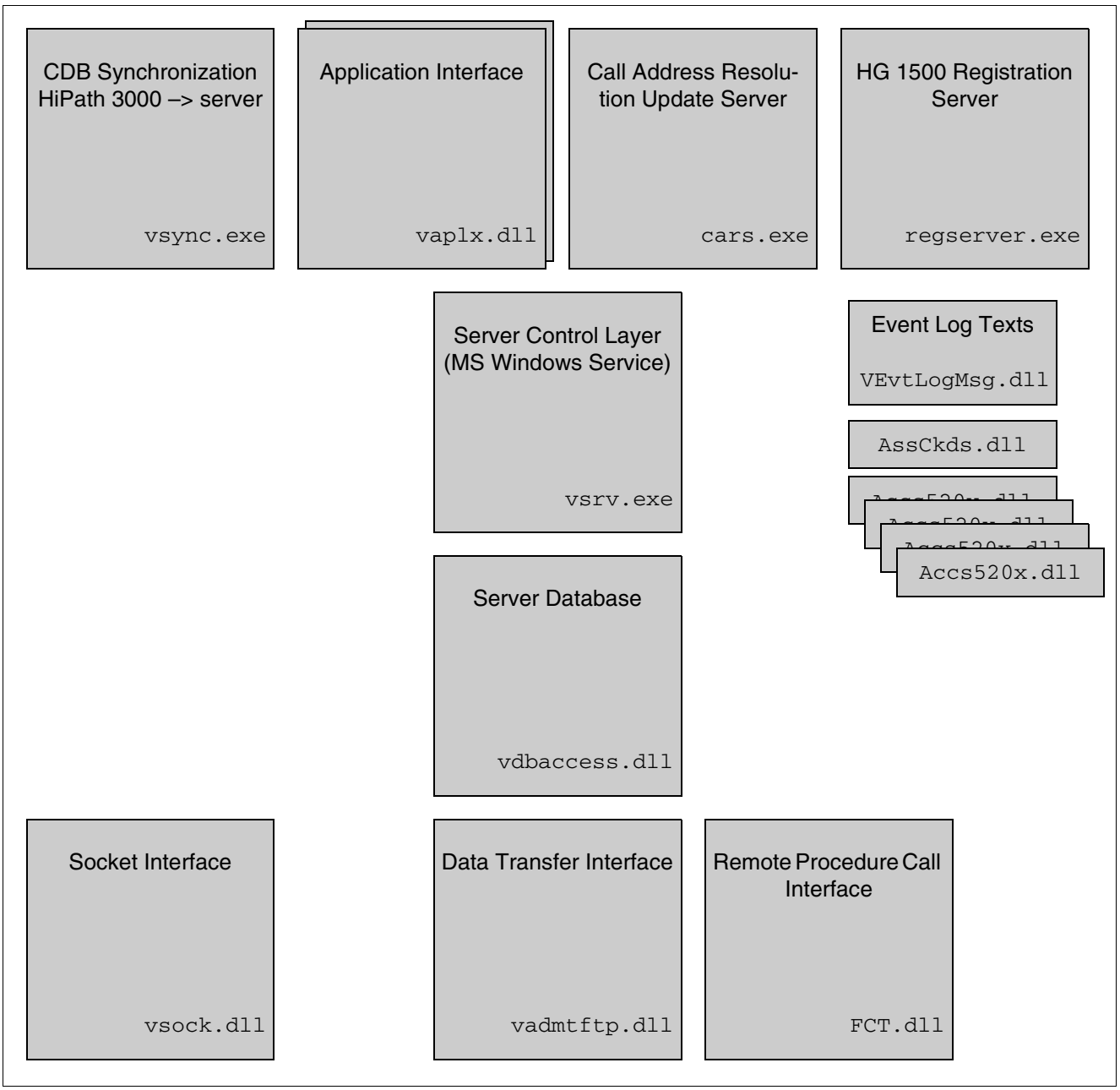


Figure 3-2 Feature Server Services and Routines

The following table shows the **most important** features of the Feature Server.

Table 3-1 Feature Server Components

Component	Function
`vsrv.exe`	Basic Feature Server component. As an MS Windows service, it starts all other components.
`vaplx.dll`	Logical interface for applications. Provides read-only and read/write access to CDB data.
`cars.exe`	The Call Address Resolution Server provides the HG 1500 boards with the call numbers of all HiPath 3000 systems (nodes) that belong to the network. Note: Event 1027 confirms that the corresponding HG 1500 board was successfully downloaded with the call numbers of all HiPath 3000 systems associated with the network.
`regserv-er.exe`	Following startup, the HG 1500 boards automatically log on to the Feature Server over the Registration Server.
`vsync.exe`	All “node-specific” CDB changes (for example, by key programming, Assistant T) are reported by the node to the Feature server’s VSYNC process. This ensures the automatic synchronization of the Feature Server with the new CDB data.
`FCT.dll`	Interface to the systems for direct CDB data access.

Presence Manager

This is a Feature Server service for signaling the call processing station states “free”, “busy” and “call” using the LEDs on the optiset E and optiPoint telephones in a HiPath 3000/HiPath 5000 network. You can pick up a call by pressing the appropriate button.

Call processing states can only be signaled for a station if the Presence Manager can set a CSTA monitor point on the relevant station. The status of a MULAP call number cannot be signaled, for example, because a CSTA monitor point cannot be set on a call number of this type.

The dssserver.exe service for the Presence Manager is installed with the HiPath 5000 software. This is a user-configured service that receives its information from `vaplx.dll`. The TAPI Service Provider is required for the Presence Manager to work.

3.3 HiPath 5000 Server PC

To use HiPath 5000, the following minimum requirements must be met:

- Hardware and software

  Table 3-2 Hardware and Software Minimum Requirements for HiPath 5000

Component	New system	Upgrade an existing system to V5.0
Processor	3 GHz CPU	Pentium III 1 GHz
RAM space	See Table 3-1	See Table 3-1
Hard disk	80 GB	18 GB
Operating system	MS Windows Server 2000 or MS Windows Server 2003	MS Windows Server 2000
Interfaces	2 x serial	2 x serial
Slots	free PCI slots (for S_0/S_{2M} boards for HPCO and HiPath Xpressions)	free PCI slots (for S_0/S_{2M} boards for HPCO and HiPath Xpressions)
Drives	3.5-inch floppy disk drive CD-ROM/DVD drive	3.5-inch floppy disk drive CD-ROM/DVD drive
Network card	10/100/1000 Mbps Ethernet network card	10/100 Mbps Ethernet network card
Monitor	17-inch color monitor	17-inch color monitor

- Licenses

  A grace period of 30 days begins after startup. Licensing must be performed for all licensed features, interfaces, and products within this grace period.

- RAM requirements of the HiPath 5000 server

  Table 3-1 can be used to determine the required RAM expansion (RAM space) of the HiPath 5000 server depending on the number of nodes in the HiPath 3000/HiPath 5000 network and the applications installed on the server.

Table 3-3 RAM Space of the HiPath 5000 Server

	Minimum RAM				
	Up to 2 nodes	**Up to 8 nodes**	**Up to 16 nodes**	**Up to 32 nodes**	**Up to 64 nodes[1]**
HiPath 5000 V5.0 + HiPath FM V3.0 + Teledata Office V3.0 + HiPath Software Manager	512 MB	1 GB	1 GB	1.5 GB	2 GB
HiPath ComScendo Service	+ 100 MB	+ 100 MB	+ 100 MB	+ 100 MB	not supported
HiPath Manager PCM V2.0	+ 90 MB	+ 90 MB	+ 90 MB	+ 90 MB	+ 90 MB
HiPath ProCenter Office V1.3 with HiPath Xpressions V3.0[2]	+ 400 MB	+ 400 MB	+ 600 MB	not supported	not supported
DLS	+ 250 MB	+ 250 MB	+ 250 MB	+ 250 MB	+ 250 MB

1 Networks are currently released with up to 32 nodes. Larger configurations can be released on a project-specific basis.

2 In this special configuration, HiPath Xpressions V3.0 supports up to 248 Unified Messaging users or 400 voice mail users.

3.3.1 Prerequisites for a Single-PC Solution

Table 3-4 shows the maximum expansion level permitted for the HiPath ComScendo Service together with HiPath 5000 (central administration unit in an IP network) and other applications on a single PC.

Table 3-4 Prerequisites for a Single-PC Solution

	Upgrade V4.0 to V5.0 1-node system (1 GHz CPU)	**2 nodes[1] (3 GHz CPU)**	**3 - 6 nodes[1] (3 GHz CPU)**	**7 - 16 nodes[1] (3 GHz CPU)**	**17 - 32 nodes[1] (3 GHz CPU)**	**33 - 64[2] nodes[1] (3 3 GHz CPU)**
HiPath ComScendo Service [3]	not possible	possible	possible	not possible	not possible	not possible
HiPath 5000 (central administration unit in an IP network)	possible	possible	possible	possible	possible	possible

Table 3-4 Prerequisites for a Single-PC Solution

	Upgrade V4.0 to V5.0 1-node system (1 GHz CPU)	**2 nodes[1] (3 GHz CPU)**	**3 - 6 nodes[1] (3 GHz CPU)**	**7 - 16 nodes[1] (3 GHz CPU)**	**17 - 32 nodes[1] (3 GHz CPU)**	**33 - 64[2] nodes[1] (3 3 GHz CPU)**
HiPath Software Manager	possible	possible	possible	possible	possible	possible
DLS[3]	possible	possible	possible	possible	possible	possible
HiPath Manager PCM V2.0	possible	possible	possible	possible	possible	possible
HiPath FM	possible	possible	possible	possible	possible	possible
Teledata Office[3]	possible	possible	possible	possible	possible	possible
HPCO including HiPath Xpressions[3]	up to 248 stations possible	up to 248 stations possible	up to 248 stations possible	up to 248 stations possible	not possible	not possible
HPCO[3]	1 to 32 agents possible	1 to 32 agents possible	1 to 32 agents possible	1 to 32 agents possible	not possible	not possible

1 Every HiPath 3000 gateway, every survivable media gateway and every HiPath ComScendo service counts as a node.
2 Networks are currently released with up to 32 nodes. Larger configurations can be released on a project-specific basis.
3 We do not recommend installing DLS, Teledata Office, HPCO (including HiPath Xpressions), and HiPath ComScendo Service together on a PC. Real-time operation of the HiPath ComScendo Service cannot be guaranteed if the lion's share of processor resources is required for DLS, Teledata Office, HPCO (including HiPath Xpressions). Software updates, call charge data queries, statistics, etc. must be performed during off-peak hours when few or no calls are underway.
If the customer is unwilling to accept restrictions, HiPath ComScendo Service must be installed on a separate PC.

3.4 Server Networking

3.4.1 Features of IP Networking

Transparent for End Users

- No special telephones are required, as the conversion of voice into IP packets takes place in the LAN gateway rather than in the telephone.
- The transfer of the general network features has no effect on the way the telephones are used, and therefore does not restrict the convenience of the telephone functions in any way.
- DTMF signals: DTMF signals are supported. It is therefore possible to have suffix dialing or to listen to voice mail over the IP network.

Support of Network-wide Features

HiPath 5000 supports the CorNet NQ protocol; in this process CorNet NQ-specific features are transmitted over the IP network (tunnelling).

The following applies: The features that are currently transmitted in a HiPath 3000 corporate network are also supported by HiPath 5000 with some enhancements in comparison to conventional networking. (see General Features).

Central Attendant Console

It is also possible to set up a central, general attendant console in the HiPath 5000 environment. There is a new feature which allows busy signaling for all communication platforms.

(See optiClient Attendant)

Note
The cross-communication platform busy signaling feature is only available with optiClient Attendant.
HiPath 5000 (Presence Manager) is not necessary for this purpose.

Automatic Routing

HiPath 5000 can perform automatic routing to a backup or alternative network for new connections. A voice network (such as ISDN dial-up connection) can also be used as a backup network. This ensures that the high availability of the Hicom is not affected by the use of IP networks for the transfer of voice and fax connections. Automatic routing is initiated if

- the communication platform selected is not accessible (for example because of an error or overload in the IP network).

- there is no more capacity available in LAN accesses (maximum number of B channels for LAN gateway exceeded)
- a connection is explicitly requested (for example a modem connection)

Note
ISDN lines are required as a trunk connection for routing data connections/VoIP connections over the integrated ISDN router.

Network Management

All communication platforms are administered using an enhanced version of HiPath 3000 Manager E. The HiPath 3000 Manager E tool is included in the scope of delivery and is installed on the HiPath 5000 server. From here, it is possible to have central administration of all communication platforms in a shared database. An application running permanently on the feature server is used for the automatic administration and maintenance of the IP routing tables and the transmission of data to the individual communication platforms *(see HiPath 3000 Manager E)*

Network management - including troubleshooting and trace activation - can be performed both locally and remotely.

3.4.2 IP Network and Application Server Requirements

3.4.2.1 Adequate Connection Bandwidth

The customer network must fulfill the following requirements to ensure that voice information is transmitted successfully via LAN:

- Switched LAN with 10/100 Mbps
- Fixed IP addresses
- Each component must have its own port at the switch (no HUBs as concentrators)
- Pure Microsoft TCP/IP network (not a Novell network with SPX)
- QoS, ToS and DiffServe (see below)

Although use in shared environments is possible, it is neither approved nor recommended, as there is no guarantee of quality. The HiPath server can also be operated in networks with routing components

Because of the data traffic between the HiPath DB server components and the server, routing connections are always open (no short-hold in the WAN).

3.4.2.2 Bandwidth

The bandwidth for voice must be available in the network at all times. For this reason, network measurement and analysis is carried out before installing the components.

Why Measure the Network?

The following data is required to calculate the required bandwidth for voice transmission in an IP network in relation to the number of simultaneous connections:

Bandwidth for voice information

All values refer to the lowest packet assembly level. The bandwidths in the WAN are only valid if the multilink and segmenting parameters have not been set.

Type	Bandwidth for each connection (full duplex)[1]
Voice with ITU G.711	50 Kbps in LAN
Voice with ITU G.723.1	22 Kbps in LAN; 19 Kbps in the WAN

[1] All values refer to the lowest packet assembling level for HG 1500 V2
HG 1500 V3 values may differ on account of this version's enhanced functions.
See HG 1500 V3 release note.

Bandwidth Requirements for Additional Services:

The specified values represent the load in relation to a maximum call volume of 1400 BHCA (this is the maximum traffic with a connected call center solution).

Type	Record size	Bandwidth requirement
Busy signal (optiClient Attendant)	300 bytes	3 Kbps
Call detail records	200 bytes	1 Kbps
ACD information	3.5 K	10 Kbps

Bandwidth Requirements for Administration (valid only for HPCO):

The specified bandwidth represents the worst case scenario. In other words, an entire CDB is sent to the server from the HiPath node every 30 seconds (max.) as a result of the synchronization process configured in the system.

It is difficult to define an accurate value at the moment due to the lack of data from the field. However, the bandwidth requirement will, in practice, be well below
132 Kbps, or there will be short-term peaks during which this value will be required by the network.

In practice, the most frequent application is the call up of key programming by users. A block of 64 KB is transferred in this process. An accepted period of 30 seconds for the transmission process results in bandwidth requirements of 18 Kbps.

Type	Record size	Bandwidth requirement
Synch by Hicom per TFTP	607232 bytes	132 Kbps

Accordingly, the minimum bandwidth required is as follows:

The necessary bandwidth must be calculated using N as the number of simultaneous connections:

Required bandwidth	Formula (Kbps) of approximate values
With ITU G.711	.. N x 90 (voice) + N x 4 (BLF+CDR) + 10 (ACD/TAPI)
With ITU G723.1	.. N x 22 or 19 (voice) + N x 4 (BLF+CDR) + 10 (ACD/TAPI)

N = number of simultaneous voice connections

When configuring fax or modem transmissions using the formula described above (outband transmission) the following are also required for each configured connection

- approximately 20 Kbps for a fax Gr. 3 (V.17, 14 Kbps) connection
- approximately 40 Kbps for modem connections (V.34, 33.6 Kbps).

for each configured connection

3.4.2.3 Requirements of Delay Times

For natural communication, the delay should amount to a maximum of 50 ms (one-way delay) for voice connections (network delay). Delays of more than 50 ms in one direction impair natural communication. The effect is similar to that experienced with voice connections over satellite. The maximum number of 15 buffer stations (HOPs) may not be exceeded.

Priority control is a particularly efficient means of reducing the delay (see next section). Please proceed with caution if the network is operated using lines with a low bit rate (for example, connection of a branch to headquarters at a rate of 128 Kbps). The maximum number of trunk lines can be determined by calculating the necessary bandwidth.

3.4.2.4 Provision of QoS in Data Networks

To guarantee the Quality of Service (QoS) described in the two previous sections, the following standards must be met:

- All the components involved in transmitting voice data must support min. IEEE 802.1q (layer 2).
- In addition, all components require routing according to the Diffserv standard RFC 2474 and the ToS standard (Type of Service) RFC 791.

3.4.2.5 Quality Assurance Procedures to be Supported

- Quality of Service (QoS) procedures in accordance with IEEE 802.1q (layer 2)
- Type of Service (ToS) in accordance with RFC 791 (layer 3), packet prioritization
- Differentiated Services (DiffServ - DS) procedure in accordance with RFC 2474 (layer 3)

3.4.2.6 Maximum Package Losses

A maximum packet loss of 3% is tolerated. The reduced voice quality associated with packet loss is greater for G.723.1 and G.729 than for G.711.

3.4.2.7 Minimization of Broadcast/Multicast Traffic

In accordance with the rules of good network design, broadcast/multicast traffic should be kept to a minimum. The use of routers/layer 3 switches to structure the network (for example VPM) or the use of layer 2 switches can help detect multicasting traffic.

3.4.2.8 Requirements for Standalone Systems:

- Switched or shared LAN (Ethernet IEE 802.3/802.3 u) with 10 or 100 Mbps
- Pure Microsoft TCP/IP network (not a Novell network with IPX/SPX)
- Fixed IP addresses (no DHCP)
- The bandwidth required for transferring additional services (CDR and ACD/TAPI information) must be taken into account. If the bandwidth is sufficient, a second protocol (e.g. Novell) may be possible.

3.4.2.9 Adaptation of QoS Classes to Oscar

Standardization according to the "HiPath QoS Strategy" involves adjusting the assignment of QoS classes on HG 1500 and in WBM:

Previous allocation in CDB 2.4:

Voice Payload = AF43
Call Signaling = AF31
Data Payload = AF21
Network Cont. = AF12

New allocation in CDB 2.5:

Voice Payload = AF12
Call Signaling = AF21
Data Payload = AF11
Network Cont. = CS7

4 HiPath 3000/5000 in the LAN Network

4.1 Network Analysis

Several protocols are used in data communications (X.25, Frame Relay, ATM and TCP/IP). The network layer IP (Internet Protocol) forms the key Internet protocol which enables interoperability with other networks and protocols such as Ethernet, X.25, Frame Relay and ATM. This is why IP is often used as a synonym for the entire technology. The protocols TCP, UDP and RTP are used for the different applications and requirements in the Internet such as "File Transfer (FTP)", "E-mail (SMTP)" and "WWW". The RTP (Real Time Protocol) is used for transmitting voice data. The term "Voice over IP (VoIP)" describes how the IP protocol is used to transport voice information.

Different protocols already exist which result from various standardization bodies and endeavors. The main standards are as follows:

- H.323
- H.450.x
- SIP (Session Initiation Protocol, for Internet conferencing and telephony)
- MGCP (Media Gateway Control Protocol)

Whereas H.323 and H.450 are "real" ITU-T standards, SIP is an "industry (de facto) standard)" from the IETF (Internet Engineering Task Force). MGCP emerged from the SGCP (Simple Gateway Control Protocol) and the IPDC (Internet Protocol Device Control) and has been submitted as a proposal to the ITU-T and the IETF.

SIP is an easy-to-implement standard which was developed to control Internet multimedia conferences, particularly to support voice communication.

MGCP describes the connection setup and cleardown of intelligent telephones in networks with packet transmission.

4.1.1 Protocols (H.323, CorNet IP)

4.1.1.1 H.323

As a collective term, H.323 comprises the following topics:

- Signaling (H.245, etc.)
- Video transmission
- Voice data transmission/voice compression such as
  – G.723.1 (5.3/6.3 Kbps)
  – G.729A (8 Kbps)
- Data applications (application sharing, T.120)

This shows that this standard comprises considerably more than necessary for pure voice data transmission via data networks. H.323 was developed for multimedia applications.

4.1.1.2 CorNetIP

IP interworking will be based on the CorNet N tunneled within H. 323 Protocol.

Bandwidth requirement

HG 1500 is designed to optimize bandwidth utilization. It implements the following functions for this:

- Silence suppression
- Transmission of background noise during pauses between speech, thereby saving bandwidth
- Dynamic voice/fax recognition/modem

Bandwidth availability

The bandwidth required for voice must be available at all times in the network. You must measure and analyze the network to ensure this is the case before installing components.

Bandwidth control for IP networking channels (PBX networking channels)

If IP networking channels are routed over the PPP channels (ISDN routing) on an HG 1500 board, bandwidth control is only performed if this board is an HG 1500 gatekeeper (signaling gateway).

Bandwidth control is not performed if the router is located on an HG 1500 gateway (media gateway).

Payload connections with RTP (Real-Time Transport Protocol) in a LAN environment

The bandwidth required for voice transmission in an IP network can be calculated using the following table:

Codec type	Packetizing parameters with WBM	Sample size (ms)	Payload (bytes)	Ethernet Packet length (bytes)	Payload packet (overhead in percent)	Ethernet Load (incl.) header (Kbps)
G.711	20	20	160	230	44%	92
G.711	40	40	320	390	22%	78
G.711	60	60	480	550	15%	73.3
G.723.1	1	30	24	94	292%	25.1
G.723.1	2	60	48	118	146%	15.7
G.729A	1	20	20	90	350%	36
G.729A	2	40	40	110	175%	22
G.729A	3	60	60	130	117%	17.3
RTCP		5000		280		0.4

Table 4-1 Codec-Based Bandwidth Requirements

The LAN load is calculated for a single route. The bandwidth must be doubled for payload connections in both directions. HG 1500 V3.0 supports VAD with codecs G.7231A and G.729AB. If you use these codecs, bandwidth requirements vary in relation to the length of idle periods in voice signals.

VLAN tagging based on IEEE 802 1q is also performed as part of the calculation. Packet length is shorter by 4 bytes without VLAN tagging.

The overhead is calculated as follows:

Protocol	Bytes
RTP header	12
UDP header	8
IP header	20
802.1Q VLAN tagging	4
MAC (incl. preamble, FCS)	26
Total	**70**

Table 4-2 Overhead Calculation

Report type	Report interval (sec)	Average Ethernet packet size (bytes)	EthernetLoad (incl.) header (Kbps)
Sender report	5	140	0.2
Recipient report	5	140	0.2
Total			**0.4**

Table 4-3 Payload Connection Check with Parallel RTCP (Real-Time Transport Control Protocol)

The following values apply to payload connections with RTP (Real-Time Transport Protocol) in a WAN environment:

Codec	Packetiz-ing	Sample size (ms)	Payload (bytes)	Packet length (bytes)	Payload packet (overhead in %)	WLAN load (Kbps)	Packet length with header compres-sion (bytes)	WLAN load with header compres-sion (Kbps)
G.711	20	20	160	206	29%	82.4		
G.711	30	30	240	286	19%	76.3		
G.711	40	40	320	366	14%	73.2		
G.711	60	60	480	526	10%	70.1		
G.723.1	1	30	24	70	192%	18.7	32	8.5
G.723.1	2	60	48	94	96%	12.5	56	7.5
G.729A	1	20	20	66	230%	26.4	28	11.2
G.729A	2	40	40	86	115%	17.2	48	9.6
G.729A	3	60	60	106	77%	14.1	68	9.1
RTCP		5000		230		0.4		0.4

Table 4-4 Codec-Based WLAN Bandwidth Requirements

The WLAN load is calculated for a single route. As WLAN channels usually contain channels in both directions, this is the same as the bandwidth requirement, for example, for an ISDN channel.

The overhead is calculated as follows:

Protocol	Bytes
RTP header	12
UDP header	8

Table 4-5 Overhead Calculation

Protocol	Bytes
IP header	20
PPP	9
Total	**46**
Compressed header	**8**

Table 4-5 Overhead Calculation

A "compressed header" is usually used for RTP/UDP/IP Header compression. In addition every 5 seconds a full header is sent (total = 46 octets).

The rule of thumb for calculating the bandwidth requirement for n parallel VoIP connections with G.711 (one frame per RTP packet) is:

Bandwidth LAN = n × (180 voice payload + 0.4 RTPC)

Bandwidth WAN = n × (82 voice payload + 0.4 RTPC)

The approximate values for voice payload changes for other codecs or packet values. In addition, the bandwidth for Attendant P, call charge information, and other applications must also be taken into account.

Bandwidth requirement for CAR-Alive/Node Survey

There are two different methods for performing CAR-Alive/node survey: either a TCP-based mechanism or an ICMP ping (configurable with Manage I or WBM).

Node Number	TCP load (Kbps)	Ping load (Kbps)	Time-out
1	0.1	0.1	12
2	0.2	0.3	
3	0.5	0.8	
4	1.0	1.7	
5	1.7	2.8	
6	2.5	4.2	

Table 4-6 LAN Bandwidth Requirement for CAR-Alive/Node Survey

Node Number	TCP load (Kbps)	Ping load (Kbps)
1	0.07	0.11

Table 4-7 WAN Bandwidth Requirement for CAR-Alive/Node Survey

Node Number	TCP load (Kbps)	Ping load (Kbps)
2	0.14	0.22
3	0.41	0.66
4	0.82	1.31
5	1.37	2.19
6	2.06	3.28

Table 4-7 WAN Bandwidth Requirement for CAR-Alive/Node Survey

The rule of thumb for calculating the bandwidth requirement for CAR-Alive between n nodes is:

Bandwidth $_{LAN}$ = n × (n-1) × bytes $_{AliveMsg}$ × 8 ÷ 1000 ÷ T $_{timeout\ between\ ping}$

and the rule of thumb for calculating the bandwidth requirement for CAR-Alive between n nodes at the HG 1500 interface is:

Bandwidth $_{LAN}$ = (n-1) × (n-1) × bytes $_{AliveMsg}$ × 8 ÷ 1000 ÷ T $_{timeout\ between\ ping}$

The value for **bytes$_{AliveMsg}$**:

in the LAN is **212** with ping or **127** with TCP
in the WAN is **188** with ping or **102** with TCP

The default timeout between two pings is 12 seconds.

The following table contains information on additional bandwidth requirements for signals:

Device/application	BHCA	Load (Kbps)
DSS server, outgoing and incoming calls	1400	2
Attendant P (busy)	1400	3
Call charge information	1400	1
ACD information	1400	10
Fax over VCAPI, 14400 bauds		2
CDB synchronization system with DBFS (TFTP, burst)		162

Table 4-8 Bandwidth Requirements for Signals

Bandwidth requirement in LAN environments with encryption:

Encryption requires higher bandwidth. In the following tables, the required bandwidth is listed based on the possible voice codecs and encryption algorithms for Ethernet packets. Encryption is carried out via an IPsec protocol stack. Out of the different operating modes possible in IP-sec, only one is described here: the ESP tunnel mode with authentication.

This operating mode offers the highest security for site-to-site VPNs.

Protocol	Bytes	Encoded?
ESP Trailer	12	
ESP Padding	Varying (**y**)	Encrypted
ESP Padding Header	2	Encrypted
Voice Payload	Varying (**x**)	Encrypted
RTP	12	Encrypted
UDP	8	Encrypted
IP (original)	20	Encrypted
ESP Header	8 + **IV**[1]	
IP (tunnel)	20	
802.1Q VLAN tagging	4	
MAC (incl. preamble, FCS)	26	
Total	**112 + IV + x + y**	

Table 4-9 Encoded Voice Packet Structure (ESP Tunnel Mode with Authentication)

1 IV = Initialization Vector. Explained in text below the table

ESP header length: The length of the ESP header depends on the encryption algorithm used. If used for cipher block chaining (block encryption), the ESP header contains an initialization vector ("IV" in table above). The initialization vector is the same length as an encryption block.

Padding: Padding with bytes is required as the encryption algorithms are based on block encryption. The entire encoded part of the packet (original IP/UDP/RTP header, voice payload, ESP padding header, ESP padding) must be an integer value which is a multiple of the encryption block length.

Encryption algorithm	Block length	Initialization vector length
AES	16 bytes (128 Bit)	16 bytes (128 Bit)
DES	8 bytes (64 Bit)	8 bytes (64 Bit)
3DES	8 bytes (64 Bit)	8 bytes (64 Bit)

Table 4-10 Block Lengths of the Encryption Algorithms

The number of padding bytes required for voice packets is calculated using the following formula:

(42 + x + y) [bytes] = N x (8 or 16 [bytes]) // N is an integer.

Bandwidth calculation for the AES encryption algorithm:

Codec	Packetizing	Sample size (ms)	Payload (bytes)	Padding (bytes)	Ethernet packet length	Payload packet (overhead in %)	Ethernet load incl. preamble (Kbps)
G.711	20	20	160	6	**294**	75%	**117.6**
G.711	30	30	240	6	**372**	50%	**99.2**
G.711	40	40	320	6	**454**	38%	**90.8**
G.711	60	60	480	6	**614**	25%	**81.9**
G.723.1	1	30	24	14	**166**	500%	**44.3**
G.723.1	2	60	48	6	**182**	250%	**24.3**
G.729A	1	20	20	2	**150**	600%	**60.0**
G.729A	2	40	40	14	**182**	300%	**36.4**
G.729A	3	60	60	**10**	**198**	200%	**26.4**

Table 4-11 LAN Bandwidth Requirement for AES Encryption – According to Codec

Bandwidth calculation for the DES/3DES encryption algorithm:

Codec	Packetizing	Sample size (ms)	Payload (bytes)	Padding (bytes)	Ethernet packet length	Payload packet (overhead in %)	Ethernet load incl. preamble (Kbps)
G.711	20	20	160	6	**286**	75%	**114.4**
G.711	30	30	240	6	**366**	50%	**97.6**
G.711	40	40	320	6	**446**	38%	**89.2**
G.711	60	60	480	6	**606**	25%	**80.8**
G.723.1	1	30	24	**6**	**150**	500%	**40.0**
G.723.1	2	60	48	6	**174**	250%	**23.2**
G.723.1	**3**	**90**	**72**	**6**	**198**	**167%**	**17.6**
G.729A	1	20	20	2	**142**	600%	**56.8**
G.729A	2	40	40	**6**	**166**	300%	**33.2**
G.729A	3	60	60	**2**	**182**	200%	**24.3**

Table 4-12 LAN Bandwidth Requirement for DES/3DES Encryption – According to Codec

Values which differ in both tables are highlighted.

4.2 QoS - Quality of Service

Subject	Cross Reference
Goals of QoS	Section 4.2.1 on page 4-9
QoS in the Router?	Section 4.2.2 on page 4-9

4.2.1 Goals of QoS

Problems:	• IP does not guarantee any bandwidths • QoS is not part of H.323
Consequences	• Time problems due to large E-mail attachments and web surfing • Network congestion due to multiple requests for the same web page • Reduced voice quality due to – Delay – Jitter – Packet loss
Goals:	• QoS is required in the WAN/LAN for – Optimum voice quality for every connection – Fewer interruptions

4.2.2 QoS in the Router?

- QoS functions control router priorities and timing.
- Router queues are optimized for routing and are not suitable for QoS monitoring of voice transmission
- Fragmentation (if used) takes time and thereby increases the risk of packet loss
- Time-controlled hierarchical policies not available
- No feedback due to insufficient monitoring
- Architecture not suitable for specialized VoIP control functions

4.3 HiPath's Network Analysis Service

Product Description

Network Analysis checks whether the customer's communication network is capable of using Siemens Business Over IP solutions. The assessment is carried out on the basis of product-specific parameters. The customer receives a final report which documents not only the network structure but also operative parameters (capacity, delay, jitter).

Customer Benefits and Profitability

- Preparation of the network for future applications (VoIP)
- Determination of current traffic flows and volumes, baselining
- Support in decision-making process when introducing VoIP solutions

Technical Specifications

Network Analysis features specification

- Inspection of customer networks to determine whether they suitable for Siemens Voice Over IP solutions
- Recording of the relevant parameters over a defined period.
- Assessment based on product specifications
- Interpretation of the recorded results with suggestions for further measures
- Final report with recommendations

Configuration Instructions

Used for the development of Siemens VoIP solutions

Use only possible in SNMP-based IP data networks (router, IP switches, hubs)

Positioning within the Product Range

HiPath services

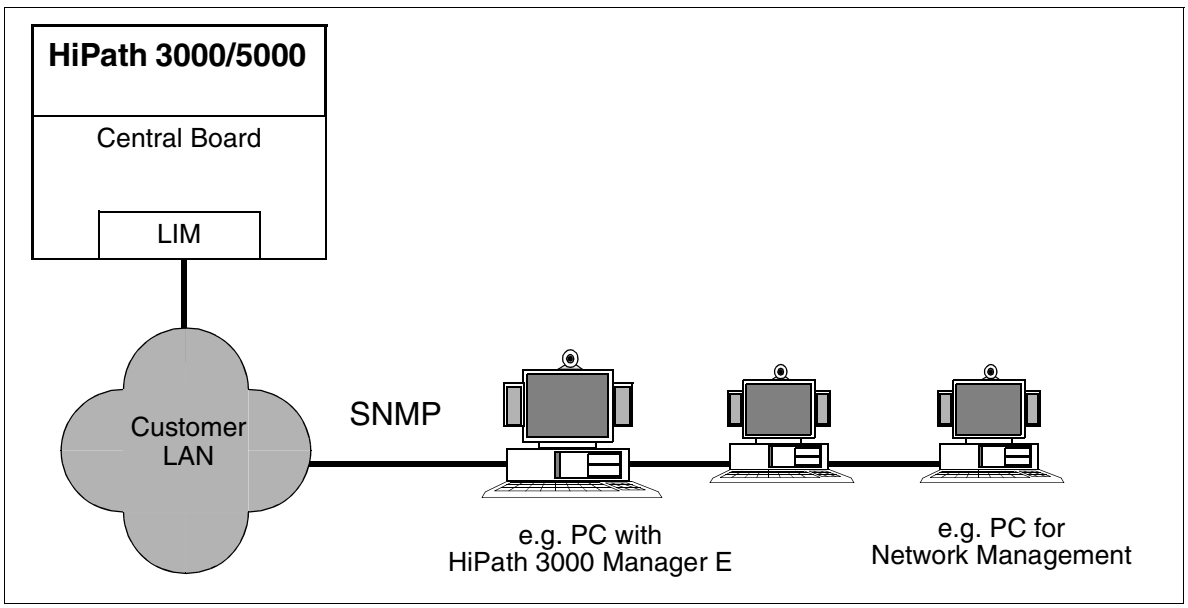
4.4 LIM Board for LAN Connection

The LIM module allows the cost-effective connection of all HiPath 3000 models in TCP/IP-based LANs for the central system administration, APS transfer, TeleData Office or HiPath Fault Management. A 10 MB 10BaseT interface with an RJ45 jack is available for the LAN connection.

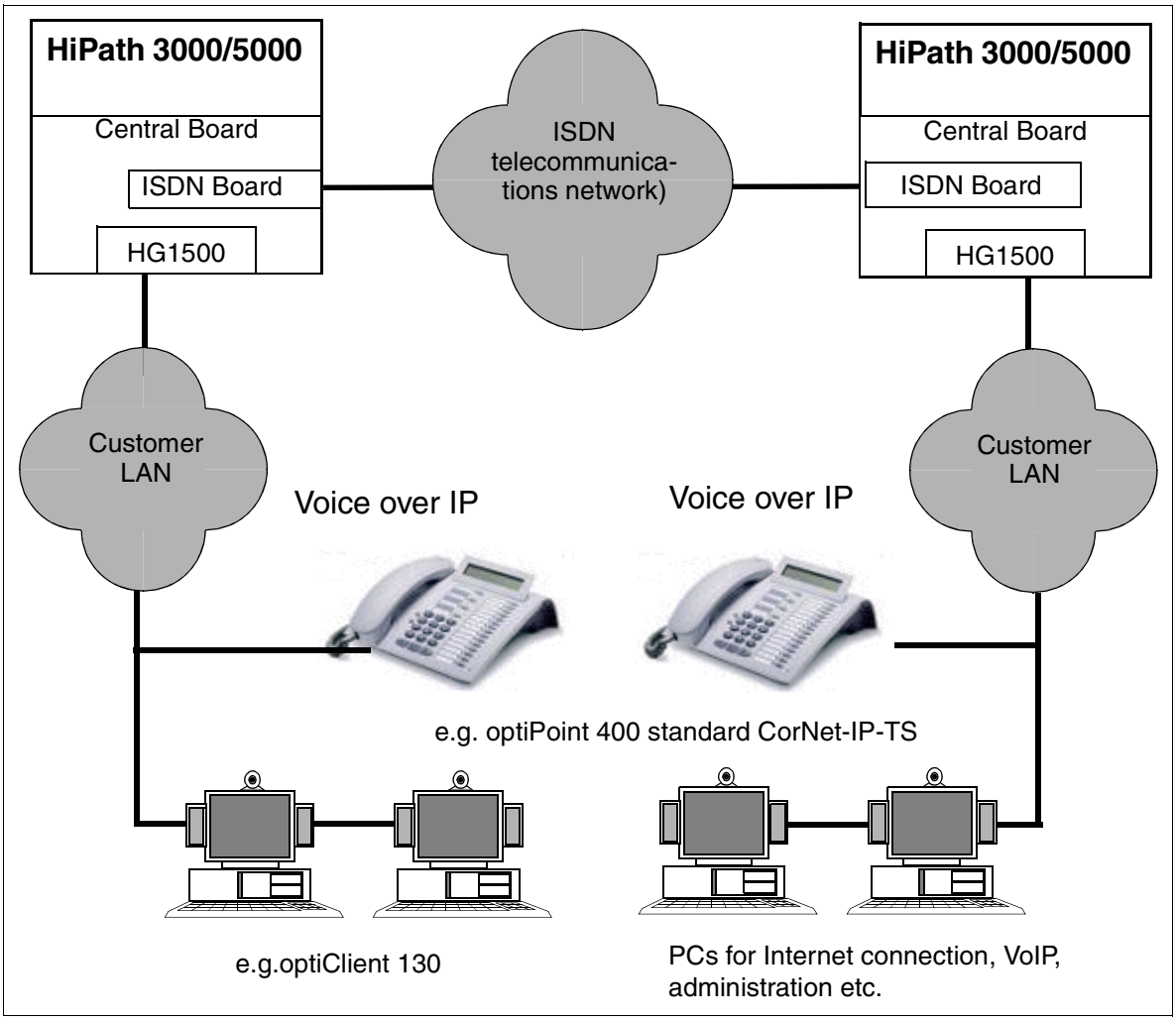
Up to 6 TAPI 120 V2.0 can be operated via the LIM module on HiPath 3000 V4.0 SMR6 or later. However, a maximum traffic value of 400 BHCA is permitted.

Power dialers are not released for use.

Systems which already have a HG 1500 board do not require the use of the LIM board as the above-mentioned functions are already provided by HG 1500.
The new LIM module replaces the previous LAN interface (Com server or V.24/E module) for the models Hicom 150 H/E OfficePro/Com/Point.



4.5 HG 1500 V3.0



Version 3.0 offers a series of new features, improvements to existing features and extensive embedding of the board in the whole HiPath 3000/5000 system

Voice over IP (VoIP) - the transfer of voice data over IP networks - is enabled in HiPath 3000 by means of the HG 1500 boards.

With Version 5.0, H.323 gatekeeper functionalities have been integrated into the HiPath 3000 communications system and into the HiPath ComScendo service (on HiPath 5000). This means that each HiPath 3000 system with at least one HG 1500 board and each HiPath ComScendo service forms a separate gatekeeper zone, which also includes any registered IP workpoint clients.

The H.323 communication between networked HiPath 3000 systems (nodes) must be considered as gatekeeper to gatekeeper communication. Registration between HG 1500 modules of networked systems is not performed. The CorNet-NQ protocol, tunnelled in H.323 via annex M1 is used.

The splitting of HG 1500 resources into signaling and payload resources is an important feature of Version 5.0.

Signaling resources

This includes all node signaling data necessary for Voice over IP for IP-supported (LAN, intranet, Internet) and line-switched networks (ISDN, PSTN). These resources are centrally provided by a single HG 1500 board, the signaling gateway (= Gatekeeper HG 1500), regardless of how many HG 1500 boards are available at the node. A HG 1500 board is defined as a gatekeeper HG 1500 using HiPath 3000 Manager E.

Payload resources

The node resources required for transferring VoIP voice data (payload) between IP-supported and circuit-switched networks are provided by the media gateway. One or more HG 1500 boards may be used.

Payload resources are not necessary for direct transmission between IP-supported networks.

In the case of systems with only one HG 1500 board, this board operates both as a signaling gateway and as a media gateway when configured appropriately by HiPath 3000 Manager E.

In the case of systems with more than one HG 1500 board, payload resources are monitored by the node-central resource manager. This is a self-configuring service. Signaling resources are centrally provided by the first HG 1500 board. This signaling gateway also accesses other media gateway resources (CODECs, B channels) and signaling data (for example RTP, RTCP). This gives IP workpoint clients and other gateways access to central payload resources of all HG 1500 boards in a node.

Resources for functions which are not based on H.323 (for example, routing channels, VCAPI channels), are provided as before by each HG 1500 board. In systems with several HG 1500 boards, resources are provided exclusively by media gateways for performance reasons.

New features of the HG 1500 V3.0

- Transparent B channel for ISDN B channel protocols
- Flexible port number administration
- Dynamic jitter buffer
- SNTP functionality in the LAN

- Read rights to dynamic parameters of HiPath3000 manager in WBM
- Improved firewall function (stateful inspection, DoS, application level gateways)
- T.38 fax protocol standard support
- Support for HFA workpoints such as optiPoint410 standard or optiPoint600 office
- Logging of QoS data (Quality of Service)
- Licensing system as for HiPath3000/5000 V5.0
- Improved software management
- Cooperation with HiPath 4000 V2.0, for example, DMC (Direct Media Connection)
- Full VPN support (Virtual Private Network)
- HG 1500 V3.0 as module of a PCS (PC-based communication server)
- STMI2 board with 32 B channels onboard, expandable to 64 channels

DMC

This flag enables or disables the feature "DMC Interworking with HiPath 4000 Systems" (in short "DMC").
In a network with HiPath 4000, DMC enhances the voice quality between IP components (end-points, gateways).

DMC is only supported by the CorNet-NQ/CorNet-IP networking protocol.

DMC should be disabled in a homogeneous HiPath 3000/5000 network. If a network with HiPath 4000 systems (version 2.0 or later) exists in which DMC is configured, the DMC feature should be enabled in the HiPath 3000/5000 systems.

The HFA endpoints (optiPoint/optiClient) registered at the HiPath 3000/5000 system and the HiPath 3000 system itself are then in a position to accept DMC connections set up by the HiPath 4000 and its HFA endpoints. Even if the DMC feature is enabled, DMC is not performed between HiPath 3000/5000 systems.

If DMC is enabled, the percentage of available DSP channel resources decreases. In other words, in a HiPath 3000 system only 80% of the channels provided for each DSP are available for connections (e.g. 6 channels instead of 8, 12 channels instead of 16, 48 channels instead of 60).

Hardware notes

HG 1500 is a HXGM3 board in HiPath 3750 and HiPath 3700, the HXGS3 board in HiPath 3550 and HiPath 3350 and the HXGR3 board in HiPath 3500 and HiPath 3300. The power supply comes from the system.

The board includes a V.24 interface for initial startup. For initial startup, you will require a special adapter cable for HG 1500 V2 and a null modem cable for HG 1500 V3. An RJ45 jack has been provided for connecting to the LAN.

System requirements

- HiPath 3000/5000 or later
- At least one Euro ISDN basic connection
  (connection to the network or another HiPath system)
- At least one free slot in the basic system

System environment

- Shared/switched LAN 10/1000 Base T
- Client/server and peer-to-peer networks with TCP/IP protocol

4.5.1 Protocols

This section contains an overview of H.323 standards regarding signaling and media protocol that are relevant to HG 1500 V3.0.

H.225.0 Q.931 Call Setup

This protocol defines signaling between two endpoints for call setup and cleardown.

H.225.0 RAS Control

RAS (Registration, Admission and Status) defines signaling between client and gatekeeper for detection and registration purposes.

H.245 Signaling

This protocol defines the declaration of capabilities and exchange of control messages between endpoints. It is used for specifying channel usage and functions.

H.323

This is a standard for packet-oriented multimedia communication systems and was developed by the ITU (International Telecommunication Union. HG 1500 V3.0 uses H.323 V4.0 but can also communicate with earlier versions of the H.323 protocol (backward compatibility is guaranteed).

Fast Connect (fast start) is supported. The Fast Connect feature lets HG 1500 V3.0 set up a multimedia channel without waiting for an H.245 connection.

RTP and RTCP

RTP (Real-time Transport Protocol) manages the transfer of real-time packets from an endpoint to one or more endpoints.

A header containing a time stamp and a sequence number is added to every UDP packet. With appropriate buffering at the receiving station, timing and sequence information enables the application to:

- eliminate double packets,
- rearrange nonsequential packets,
- synchronize data,
- achieve continuous playback despite varying latencies.

RTCP (Real-time Control Protocol) is used for controlling RTP. It enables:

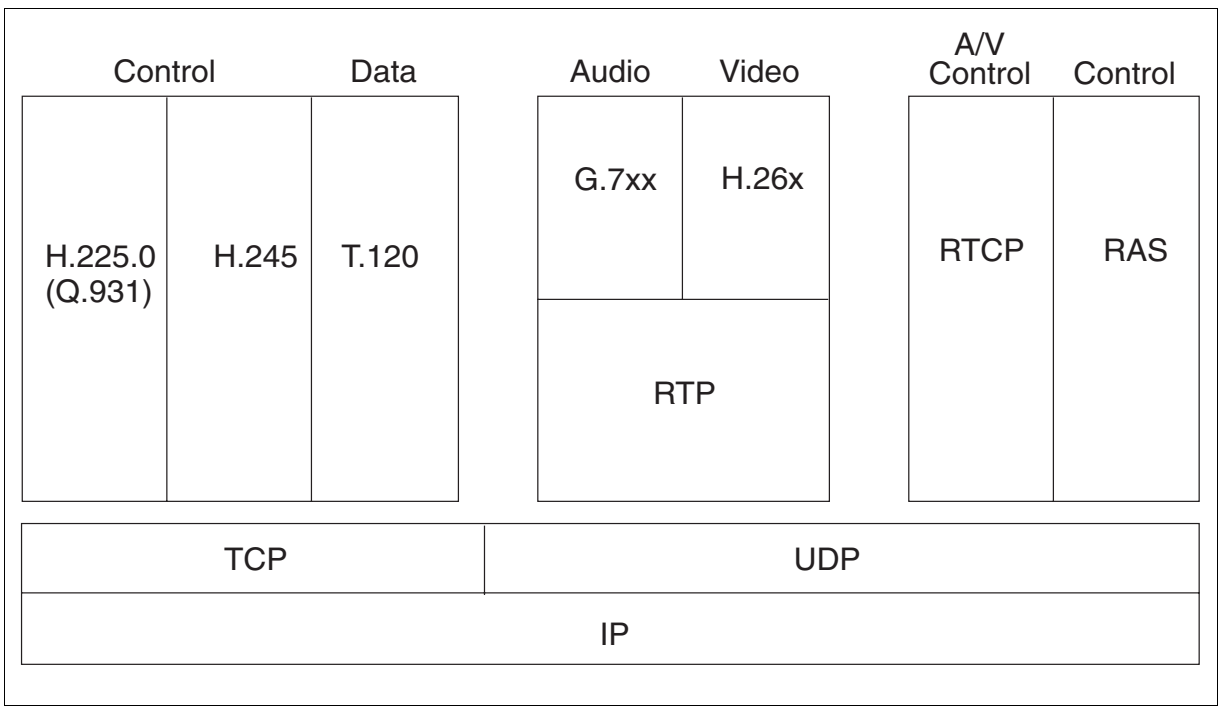
- Quality of Service (QoS) monitoring,
- transferring of information about session participants,
- regular distribution of control packets containing quality information to all session participants.

TCP

TCP (Transmission Control Protocol) provides a connection-oriented mode for data transmission. TCP guarantees a sequenced, error-free, flow-controlled transmission of data packets. However, this can delay data transfer and reduce throughput. H.323 uses the end-to-end services of TCP for the H.245 control channel, data channels and the call control channel.

UDP

The UDP (User Datagram Protocol) provides a connectionless transmission mode that promises nothing more than a "best effort" delivery. Only a minimum of control information is transferred with UDP. H.323 uses UDP for audio, video and the RAS channel (see RFC 768).



4.5.1.1 Protocols Used

PPP	Point-to-Point Protocol	Transport protocol between LAN and SCN
PAP	Password Authentication Protocol	Transport protocol for ID and password
CHAP (MSCHAP)	Challenge Handshake Authentication Protocol	Transport protocol for encrypted ID and password (MS = Microsoft-specific protocol)
IPCP	IP Control Protocol	Transport protocol for IP addresses
PPPoE	PPP over Ethernet Protocol	Transport protocol between LAN and SCN over Ethernet
PPTP	Point-to-Point Tunneling Protocol	Transport protocol for tunneled PPP connections
IP	Internet Protocol	Transport protocol for data transfer to IP or MAC addresses without a connection
ICMP	Internet Control Message Protocol	Control protocol that supports IP protocol with error messages
UDP	User Datagram Protocol	Transport protocol for data transfer without a connection
TCP	Transmission Control Protocol	Transport protocol for connection-oriented data transfer
DHCP	Dynamic Host Configuration Protocol	Protocol for dynamic configuration of host systems
ARP	Address Resolution Protocol	Protocol for linking IP addresses with MAC addresses
FTP	File Transfer Protocol	Protocol for file transport between network nodes
TFTP	Trivial File Transfer Protocol	Simple file transport protocol
RTP	Real-time Transport Protocol	Transport protocol for real-time audio and video packets
RTCP	Real-time Control Protocol	Control protocol for RTP
HIP	HDLC Internet Protocol	Control protocol for transferring encapsulated data in the Internet
Telnet	Protocol	Dial-in protocol for remote access via the Internet

Table 4-13 Protocols Used

H.225.0	Annex G	Signaling protocol for edge gatekeepers in different domains
	Q.931	Signaling protocol for call setup and clear-down between two endpoints
	RAS Control	Defines signaling between client and gate-keeper for detection and registration
H.235	Standard	Signaling protocol for authentication and encryption
H.245	Standard	Signaling protocol for defining usage of functions and channels
H.323	Standard	Transport protocol for packet-oriented multimedia communication systems
H.341	Standard	Definition of Management Information Base for controlling and administering an H.323 network
H.450	Standard	A series of protocols that define signaling between endpoints for supplementary services
HTTP HTTPS	Hypertext Transfer Protocol (Secure)	Transport protocol for transferring text and graphics in the Web (secure connection)
SNMP	Simple Network Management Protocol	Connection protocol for network management systems

Table 4-13 Protocols Used

4.5.2 Security/Firewall/Packet Filter

HG 1500 features status-dependent control filters. The status-dependent control checks are performed over "flows". A "flow" is stream of associated packets and all the error ICMPs (including path-MTU messages) that affect these packets. In TCP terms, a flow is defined on the basis of IP addresses and port numbers, and consists of both the TCP packets and all associated error ICMPs. This is similar for UDP.

DoS: HG 1500 offers protection against various Denial-of-Service attacks and other network-level attacks, such as, SYN flooding, various fragmentation attacks, TCP hijacking (different active attacks, for example, via ARP spoofing), LAND (identical source and destination IPs), so-called "Christmas trees" (all TCP flags set), etc.

4.5.3 IP Networking

In IP networking, the HG 1500 V3.0 connects telephone systems transparently over an IP network. As shown in the following diagram, this connection can be over the Internet – to connect a branch office to a company network, for example – as well as over a private IP network – to link departments in a single location, for example.

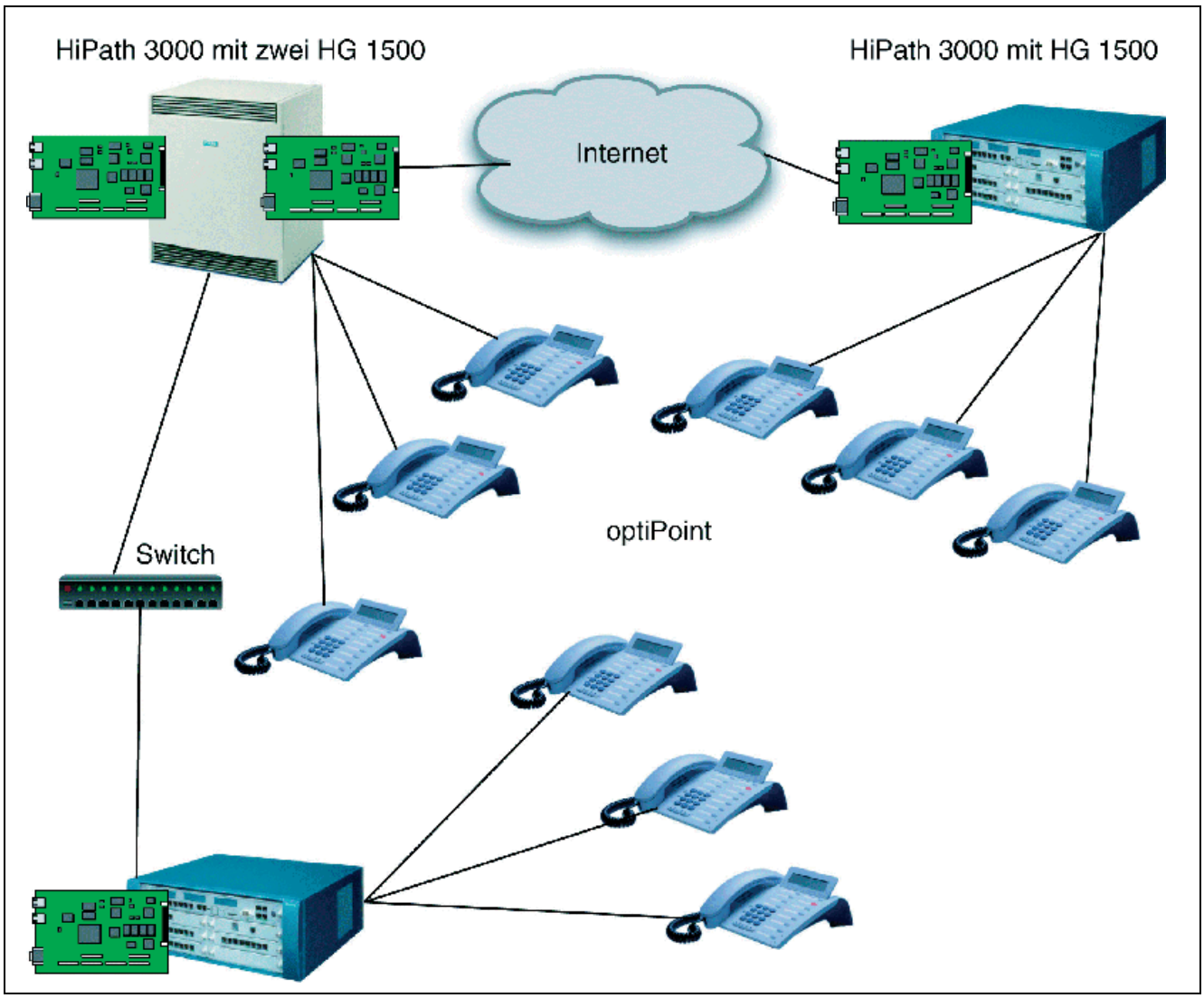


Figure 4-2 Example of IP Networking

In IP networking, IP connections transparently replace conventional dedicated lines or PSTN dial-up lines between the telephone systems involved. Traffic between these systems can thus be managed cost-effectively via IP connections. In-house connections can use existing IP cables.

4.5.3.1 IP Networking with HiPath AllServe

In combination with a HG 1500 V3.0, the HiPath AllServe integrates the connected nodes – HiPath 3000 systems with one or more HG 1500 V3.0 – to form a transparent, integrated communications system. All the networked nodes, whether connected locally or via the Internet, behave like a single, complete system with closed numbering.

The majority of HiPath AllServe functions are available systemwide on all components connected via IP networking. The following list shows the main functions.

- Central attendant console

  A specific system terminal (subscriber) can be configured as an attendant or intercept position. Any incoming call to the system will arrive here automatically if no subscriber can be assigned to it, although the call may originally have come in on any one of the nodes connected via IP networking.

  The central attendant console can then forward these calls to the required subscriber. Again, it is not important to which node in the HiPath AllServe this subscriber is connected.

  Once the attendant queue reaches a predefined length, calls can be automatically forwarded to an overflow destination.

  When an optiClient Attendant is used, cross-node busy signals for up to 120 stations (up to 100 of these on one node) are available.

- Virtual Ports

  Virtual ports are used for the signaling of statuses and calls on all systems. They are not linked to physical terminal interfaces. The corresponding boards must not be inserted. Virtual ports have their own internal and external phone numbers and can therefore be called. They can be programmed for signaling on DSS keys and be added to call pickup groups.

- DISA Internal (Direct Inward System Access Internal)

  Using DISA internal (not to be confused with DISA external) enables a subscriber in a HiPath AllServe node to activate specific features in a different node:

  - Release of the door opener using the relay option
  - Follow me
  - Relay on/off
  - Night service
  - Disconnecting from a hunt group/group call

- System Speed Dialing

  The local speed dialing directories of all nodes are updated using a redundant central speed dialing directory on the HiPath AllServe server. This provides all IP telephones connected to the HG 1500 V3.0 with the same speed dialing as SCN telephones.

- CO Call Privileges and Toll Restriction

  The CO call privileges configured for each HiPath AllServe node are handed over as before in converted form via CorNet-N. The allowed numbers and denied numbers lists for a subscriber can only be analyzed in the HiPath AllServe node in which the subscriber is configured. The dial plan can be used to specify where the toll restriction is to be executed. Please note that in this process all allowed numbers and denied numbers lists are mapped to "Can access local public network". This in turn is mapped to denied numbers list 1 in a subsequent node. Consequently, it is possible that in a subsequent node a toll restriction with denied numbers list 1 will be set up again or added.

- Least Cost Routing (LCR)

  In a HiPath AllServe environment, LCR is possible via CO trunks as well as IP connections. The dial plans for single HiPath AllServe nodes can be configured separately. If so configured, "Fallback to SCN" function can be used to forward a call automatically to an SCN connection if the IP connection fails.

  When an external call is forwarded to another node (transit break-in), the caller's number is converted automatically to the international format.

  In a HiPath AllServe environment, the previously used route codes are replaced by port numbers. This type of configuration is better suited for a LAN environment.

- Music on Hold (MOH)

  In a HiPath server node, a PCM/IOM channel can be permanently connected to MOH. This channel is permanently connected to a DSP channel that forwards MOH unidirectionally to one or more IP clients or other HG 1500 boards. MOH for IP clients always requires only one DSP channel. (Normal clients cannot benefit from this; for MOH, they require an additional a PCM/IOM and a DSP channel respectively.)

  The channel for MOH is automatically assigned by the system.

- Direct Station Select (DSS) and Busy Lamp Field (BLF)

  In HiPath AllServe versions 3.0 and later, the DSS function – signaling the switching states of subscribers – is available at all terminals in the system, even those on other nodes, through the HiPath AllServe server. This provides a system-wide call pickup solution, and is completely transparent to the terminal user programming the DSS keys.

- CorNet IP

  HiPath AllServe supports the CorNet IP protocol, which is used for tunneling CorNet features by IP. This makes the functional scope of the CorNet protocol available to IP terminals as well. More details of these functions can be found in "HiPath AllServe System Description", Chapter 3, "Features".

4.5.4 Voice over IP (VoIP)

Voice over IP (VoIP) enables voice data to be transmitted over an IP network, both internally and via the Internet.

Voice over IP (VoIP) is an outstanding feature of HG 1500 V3.0. In combination with the clients connected to the LAN, the board makes it possible to use not only VoIP but also the telephony features of the system. In particular, this feature can be used for teleworking. This means that full Voice over IP functionality is available at the teleworking PC. H.323 clients (for example NetMeeting) can also be used.

As of the HiPath 3000 V3.0 software version in combination with new boards (HXGS3, HXGM3, HXGR3), login is no longer performed under "Voice Gateway" in HiPath 3000 Manager I but in HiPath 3000 Manager E.

The following combinations of VoIP connections via the HG 1500 V3.0 are possible:

- IP to IP, for example, subscriber C to subscriber D or subscriber D to subscriber F.
- IP to local SCN, for example, subscriber D to subscriber B.
- Local SCN to IP, for example, subscriber B to subscriber C.
- IP to PSTN, for example, subscriber C to subscriber E.
- PSTN to IP, for example, subscriber E to subscriber D.

Interworking is fully supported.

With the exception of IP to IP connections, one DSP channel per connection is required for each HG 1500 V3.0 involved. Conferencing requires one DSP channel for each SCN subscriber.

In IP networking, SCN to SCN connections (local or PST) also can be run transparently via the HG 1500 V3.0. This is described in Section 4.5.3, "IP Networking".

This can lead to significant call charge savings if an appropriate IP network is available. The user can also avail of telephony features, such as name transmission and callback, in the usual way.

The hardware prerequisite for IP networking is that the systems involved must have at least one of the following HG 1500 V3.0 boards:

- HXGM: Up to eight boards can be installed in an HiPath 3700/3750. With two PDM1 expansion modules, each HXGM offers up to 32 IP channels for voice connections (Voice over IP).
- HXGS (wall housing) or HXGR (19" housing): Up to four boards can be installed in HiPath 3500/3550 and up to two in HiPath 3300/3350. Both boards can process up to 16 IP channels for voice connections with a single PDM1 expansion module.

The IP networked systems and the HG 1500 V3.0 boards are administered with two different tools:

- HiPath 3000 Manager E: Extending the existing HiPath 3000 customer database to include information for IP networking.
- HG 1500 V3.0 WBM: Performing HG 1500 V3.0 board settings.

The IP address used for IP networking is always that of the first LAN interface. If IP networking is routed via another interface, such as LAN2, use IP routing entries to ensure that the LAN1 interface can be reached.

4.5.4.1 General Parameters for Voice over IP

Before configuring system clients and H.323 clients, you must configure the valid parameters for both variants in HiPath 3000 Manager E:

- Echo:
  You can define here how to compensate for the echoes that occur in connections to conventional telephones via the voice gateway.
- Traffic statistics:
  This is where you define whether to record traffic statistics which can then be queried via SNMP.
- Encoding:
  This parameter is used to select which voice coding will be implemented.

4.5.4.2 Voice Coding

HiPath 3000/5000 supports voice compression according to the G.729 and G723.1 standards. G.723.1 facilitates the use of teleworking via ISDN for example, and reduces the load on the existing data network. G.723.1 reduces the VoIP bandwidth requirement for voice communication. This enables a bidirectional voice connection via an ISDN B channel. This, in turn, facilitates the connection of teleworkstations or branch offices to the company network via a 64 KB connection. However, it is not advisable to operate other applications (such as Application Sharing, File Transfer) in addition to a bidirectional VoIP connection simultaneously via 64 Kbps since this generally leads to a deterioration in voice quality. It is recommended that both B channels of an S0 connection are used for this purpose.

The HG 1500 V3.0 supports codecs for compression and decompression of voice signals in accordance with industry standards G.711 A-law, G.711 µ-law, G.723, G.729A and G.729AB. The codecs can be arranged according to their priority. The gateway automatically attempts to use a codec with the highest possible priority for each connection.

The HG 1500 V3.0 supports the following codecs:

- G.711 (A-law and µ-law) voice coding – an ITU (International Telecommunication Union) standard for voice coding at 56 or 64 Kbps
- G.723.1 voice compression – an ITU standard for voice coding at 5.3 or 6.4 Kbps
- G.729A and G.729AB voice compression – an ITU standard for voice coding at 8 Kbps

4.5.4.3 DTMF Handling

DTMF (Dual-Tone Multifrequency) is the type of audio signal used for tone dialing in accordance with ITU-T standard Q.24. It can be used for call setup and for signaling during a call.

HG 1500 V3.0 supports the detection and processing of DTMF (Dual Tone Multi Frequency) signals in accordance with Q.24 regarding signaling for VoIP calls. In particular, it supports the following functions:

- Detection of DTMF signals
- Conversion of DTMF signals into user input signals in accordance with H.245
- Generation of DTMF signals for PSTN
- Speech protection using Bellcore test tapes
- Sending and receiving DTMF signals via VCAPI

4.5.4.4 Voice Quality

Various HG 1500 V3.0 functions ensure optimum voice quality during VoIP connections. Further details are described below.

Quality of Service (QoS)

QoS enables voice packets to be given higher priority than other packets in the IP network so that voice quality is influenced as little as possible by other data traffic.

To ensure the best possible quality especially for voice connections, the HG 1500 V3.0 supports various QoS protocols:

- IEEE802.1p tags (layer 2)
- Type of Service (ToS) prioritization (RFC 791, layer 3)
- Differentiated Services (DiffServ; RFC 2474, layer 3)

The gateway observes these standards for routed packets and makes them available for applications on the gateway, such as VCAPI.

Echo suppression

HG 1500 V3.0 supports echo suppression in accordance with G.168 to ensure acceptable voice quality in the WAN. Echo suppression is effective for round trip delays of up to 48 ms.

Dynamic jitter buffer

The dynamic jitter buffer eliminates the distortion caused by fluctuations in the arrival of voice and video packets. Individual packet delays can be a result of network overload or internal processing within the LAN endpoints.

The HG 1500 V3.0 jitter buffer can be configured for the connection requirements of a specific network.

Voice Activity Detection

VAD (Voice Activity Detection) checks all incoming signals for voice signals. If a signal exceeds a preset level, the VAD recognizes it as voice and anything under that level as silence.

The HG 1500 V3.0 provides VAD and silence suppression for all supported codecs. When no voice signal is detected, a background noise is inserted at each end of the line to emulate traditional telephone line conditions.

4.5.4.5 Environmental Requirements for VoIP

To ensure voice transfer quality and avoid unacceptable delays, the networks being used must meet certain requirements.

Environmental Requirements in the LAN

LANs used for VoIP must meet the following specifications:

- At least 256 Kbps transmission capacity per networked unit
- Not more than 50 msec delay in one direction (One Way Delay) Not more than 150 msec total delay
- Not more than 1% packet loss
- QoS support – IEEE 802.1p, DiffServ (RFC 2474) or ToS (RFC 791)
- Every HG 1500 V3.0 must be connected via a switch or a dedicated port of a router.
- It is recommended that the VoIP application be connected via a separate VLAN to reduce collisions with other transmissions. If all involved devices support VLAN (in accordance with IEEE 802.1q), all VoIP traffic can be placed in a separate VLAN. For administration access in this case, LAN switches must provide individual computers with access to multiple VLAN segments.

- Not more than 20% of the available bandwidth should be used.
- Not more than 10% of the total data traffic should be broadcast packets.
- The error rate should not amount to more than 1% of data traffic and should not tend to increase.

Environmental Requirements in the WAN

LANs that are linked over WANs and share the same VoIP functionality must meet the following minimum requirements:

- Each LAN must each be connected to the Internet via xDSL with a fixed IP address.
- QoS support – IEEE 802.1p, DiffServ (RFC 2474) or ToS (RFC 791) – over the entire connection
- The bandwidth required for the calls must always be available in both directions, to the network and to the user.
- Not more than 50 msec delay in one direction (One Way Delay) Not more than 150 msec total delay
- Not more than 3% packet loss
- Not more than 3% error rate
- Not more than 10% jitter
- As little broadcast and multicast traffic in the network as possible. If necessary this can be achieved by structuring the network – using VPN, for instance – with Layer 3 switches and routers, or with Layer 2 switches that recognize multicasting.
- Not more than 40% network load (without VoIP traffic)
- Less than 40 broadcast packets per second if possible

Environmental requirements for fax/modem over G.711

Fax/modem over G.711 can be enabled if the IP network satisfies the following requirements:

Value	Time
Jitter	<= 20 msec
Delay (one way)	<= 50 msec
Delay (round trip)	<= 100 msec
Packet drop	<= 0.05%

Table 4-14 Prerequisites for Modem over G.711

If the above values are not observed in the IP network, the fax or modem transmission may be interrupted.

4.5.5 Fax over IP with HG 1500 V3.0

Fax over IP guarantees the compatibility of traditional analog fax devices in IP telephony networks. The following scenarios must be taken into account when using the real-time communication system HiPath 3000 with the HG 1500 V3.0 board.

For Fax over IP the IP network must meet certain quality criteria that are determined in the network analysis as otherwise interruptions can occur in the fax transmission. Otherwise the connection and marketing of separate trunk lines should be provided for each node.

In general, an IP trunking network is when two or more HiPath 3000 systems are networked to each other over the integrated HG 1500 V3.0 board. The HG 1500 V3.0 board supports two functions for transferring the fax information.

- Fax over G.711 (end-to-end connection)

  The advantage of E.711 is that (unlike T.38) high speed faxes (in other words faxes with a transmission rate > 14400 bps) can also use this higher transmission rate on a good network, while high speed faxes must be slowed down to a speed of 14400 bps when T.38 is used.

- T.38

  T.38 is an ITU standard that describes how two fax machines communicate over IP. This standard refers to a real-time transmission of fax documents because the formats for transmitting the signalling and user data between two gateways are described here.
  The image data (T.4 or T.6 format) and control messages (T.30 format) are packed in special T.38 messages and sent via the IP network. The packets are either used with TCP (Transmission Control Protocol) or UDP (User Datagram Protocol).

  At present HG 1500 V3.0 only permits transmission with UDP and not with TCP.

  The advantage of D.38 is that it is more resistant to
  packet loss and jitter in less than perfect network conditions.

  The functions were tested on the following devices:

  – Siemens HF2323
  – Siemens Fax 790
  – Canon Fax B155,
  – Hewlett-Packard OfficeJet Model 635,
  – OKI OKIFAX 4580,
  – OKI OKIFAX 4550,

– Samsung SF-350,

– Philips magic 2 primo

UDP

This protocol is an non-secure connection. IP packets are sent without knowing whether they are received. Thus, this procedure has a number of disadvantages. If you are not sure that the information has been received, then greater effort is required to secure this information.

Security mechanisms

- FEC procedure (Forward Error Correction)

  In this procedure, every "mandatory message" is given a number of previously compressed packets. The number of FEC packets sent with the message is indicated in a supplementary field that can change at any time. To enable the remote station better to identify the packet sequence, each "mandatory message" is given a "sequence number".

- Redundancy procedure

  In this procedure, additional IFP pages are sent with a "mandatory message". The number of "redundancy messages" is defined in advance and cannot change during transmission. The "mandatory message" is given a "sequence number" to enable the packets to be identified clearly.

4.5.6 Fax over VCAPI

In the case of Fax over VCAPI, virtual fax devices are connected to a LAN and the HG 1500 V3.0s replace the S0 cards in the customer PCs. These virtual stations are installed at a PC and exchange their fax information over a separate specially developed interface. The CAPI protocol was used as a basis to provide the same functionality as a PC card. This information is then processed in the HG 1500 V3.0, packetized into T.30 messages and converted by a special component (DSP) into 3.1 kHz audio PCM signals.

VCAPI Connections

The virtual fax device is installed as a software application in a PC. A special driver is used for connection to the HG 1500 V3.0. Starting up the application activates the PC and the HG 1500 V3.0 board and enables the fax functionality.

The only restriction that applies concerns the number of VCapi PCs that can send faxes simultaneously. Voice coding;G.711;G.723.1;G.729

4.5.7 Modem via IP

As for the encapsulation of voice transmission on IP routes, the HG 1500 V3.0 can also route analog data between modems over an IP connection.

This function enables connections to be made between traditional analog modems in IP networks. The HG 1500 board different functions for transferring the information:

Modem over G.711 Voice Codec (recommended)

Like faxes, modems can be used to switch a transparent connection over two networked systems with the G.711 voice codec.
Special limits in terms of delay, jitter, and packet loss network parameters must be taken into account for the IP network. This function does not support compressed transmission (G.723). The transport and security protocols that can be used depend on the modems in operation and not on the HG 1500

V.90 Standard

The V.90 Standard (56K) is supported in the "modem over G.711" procedure. Please note, however, that an approximate speed of 56 Kbps is only reached in the downstream direction

Bit Rate Adaptation V.110

The HG 1500 supports V.110 bit rate adaptation to guarantee remote access with GSM terminals using asynchronous PPP. However, this only supports the conversion of GSM-specific data transmission speed of 9600 bps into the ISDN bit stream of 64 Kbps.

4.5.8 HiPath Feature Access (HFA)

HiPath Feature Access (HFA) provides telephones connected via IP (such as optiPoint 400) and compatible telephony software (such as optiClient 130) with all the functions that can also be used by optiPoint telephones in SCN. For this purpose, CorNet TS protocol – with which the terminals are addressed – is tunneled over IP.

In connection with a HG 1500 V3.0, IP telephones are then equivalent to the classic optiPoint telephones on a HiPath system.

4.5.9 Internet Gateway

The HG 1500 V3.0 can function in a variety of ways as an Internet gateway for clients in the LAN or for dialed-up devices.

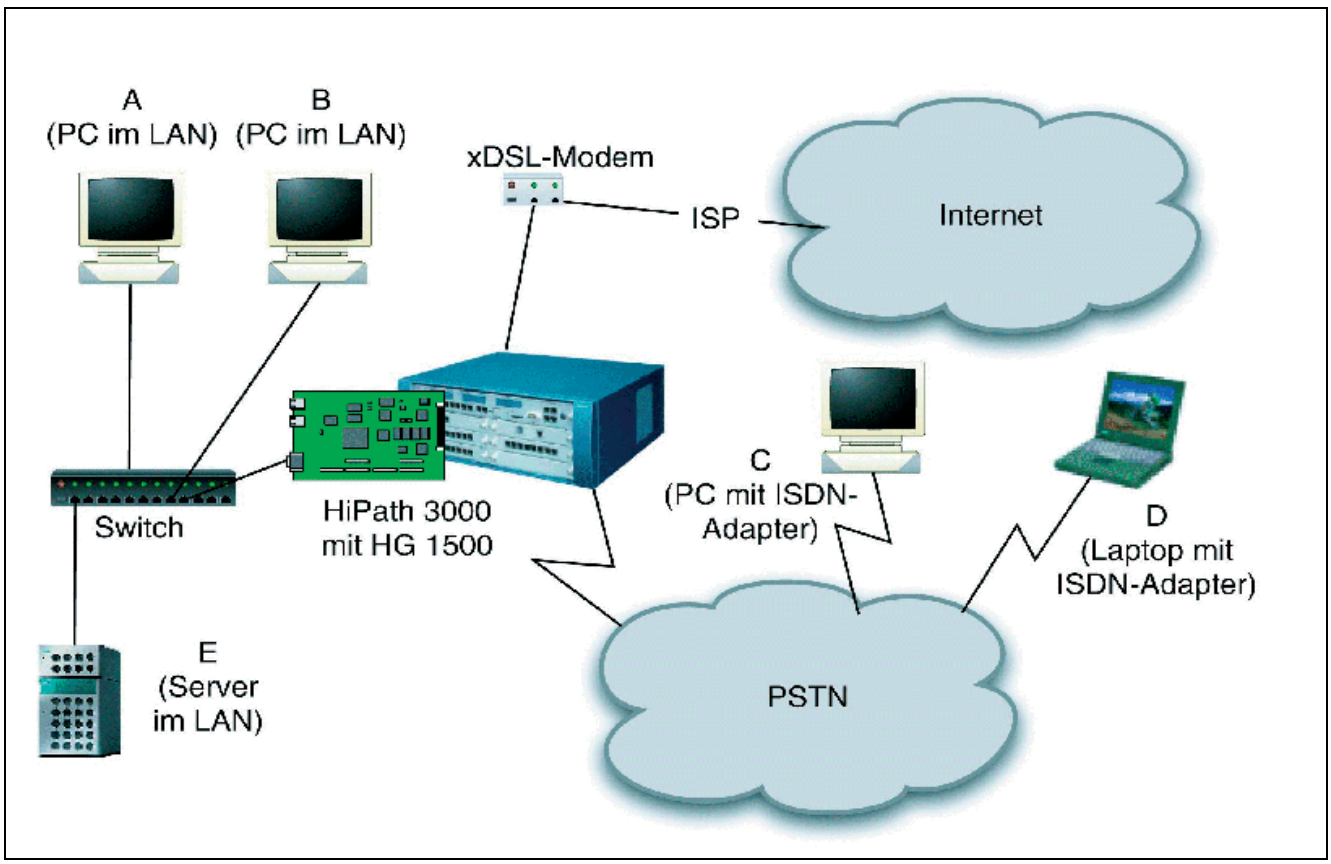


Figure 4-3 HG 1500 V3.0 as Internet Gateway (xDSL)

The second Ethernet interface enables connection of an xDSL modem which the HG 1500 V3.0 addresses via PPPoE. Any client connected to the HG 1500 over IP can use an Internet connection via this modem. Multiple clients can utilize the Internet connection simultaneously thanks to NAT support (see Section 4.5.9.2, "Network Address Translation (NAT)").

Clients that are connected to the HG 1500 V3.0 via a PSTN dial-in connection (RAS functionality) can also utilize the Internet connection. If appropriately configured, these users can also access servers in the LAN.

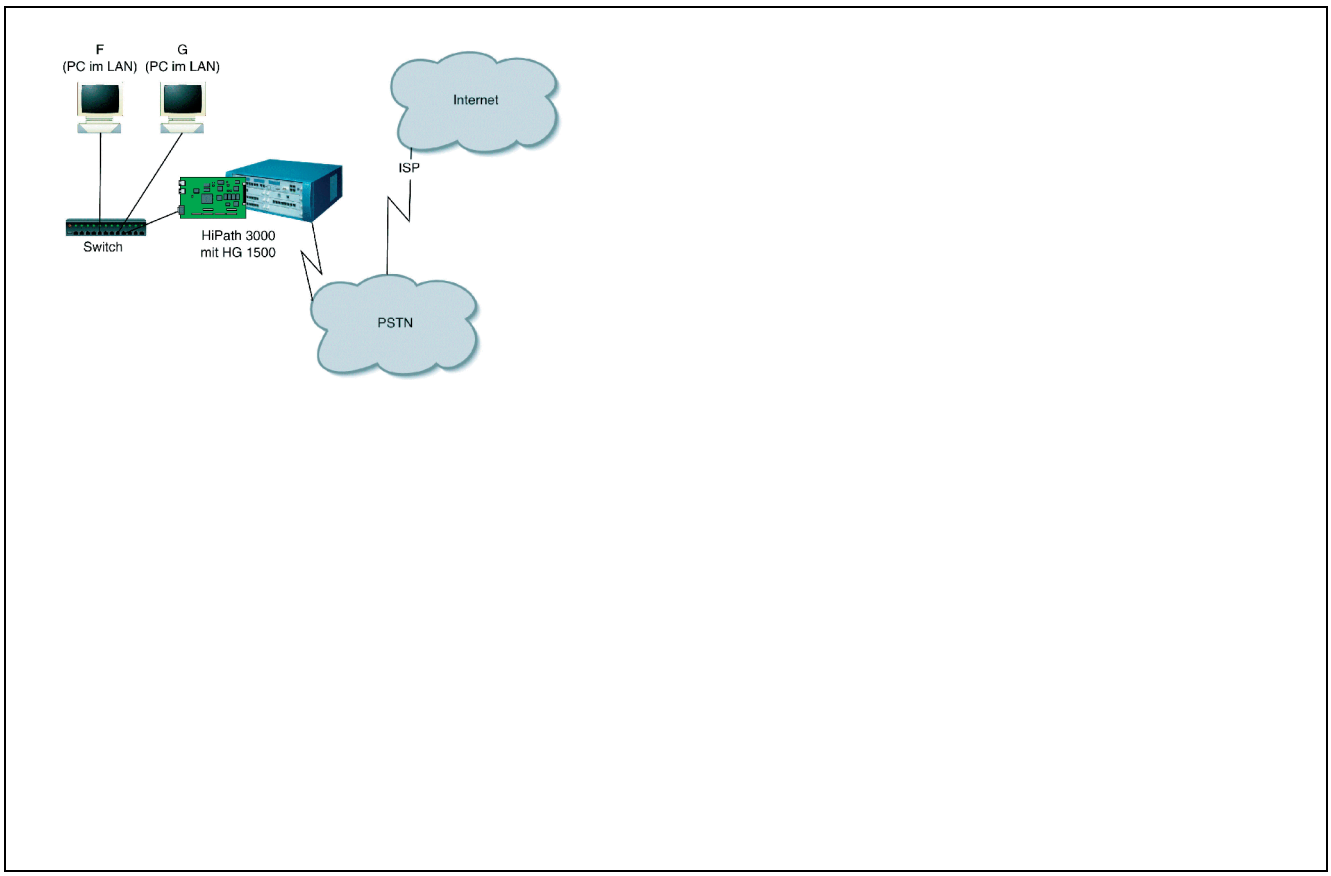


Figure 4-4 HG 1500 V3.0 as Internet Gateway (ISDN)

The HG 1500 V3.0 can also set up a PPP connection to an ISP via one or more B channels. This connection, too, can be used simultaneously by multiple clients in the IP network.

4.5.9.1 PPP, PPPoE and PPTP

The HG 1500 V3.0 supports PPP (Point-to-Point Protocol) for both incoming and outgoing SCN connections. PPPoE (PPP over Ethernet) and PPTP (Point-to-Point Tunneling Protocol) are supported for devices on the second LAN interface (typically an xDSL modem).

Connections from the LAN to the SCN are set up on the basis of the IP address addressed by the LAN. The IP address is converted to a station number (this requires appropriate configuration of the routing and dial tables). A prerequisite is that the remote station has a static IP address.

After the connection has been set up, the HG 1500 V3.0 can accept a dynamic IP address. Packets for terminals in a local IP network are converted with NAT (see Section 4.5.9.2, "Network Address Translation (NAT)").

There are various security and authentication mechanisms for PPP connections. Further details can be found in Section 4.5.9.3, "Access Protection".

4.5.9.2 Network Address Translation (NAT)

Network Address Translation (NAT) is the conversion of IP addresses in the LAN for the Internet. HG 1500 V3.0 provides NAT for Internet connections via a second Ethernet interface as well as for PPP connections via B channels.

As far as the Internet is concerned, the entire LAN appears to be a single IP address and can therefore use a common dial-up connection to an ISP, for example. Additionally, direct IP attacks from the Internet on terminals in the LAN are not possible.

NAT can be enabled and disabled in the HG 1500 V3.0. Certain services – such as VoIP or video telephony – embed subscribers' IP addresses in their data packets, however, instead of just noting them in the packet headers. They are only compatible with NAT within a VPN.

4.5.9.3 Access Protection

A variety of security functions are available to prevent unauthorized usage:

Checking Caller Numbers

Connections from the PSTN can be checked against a list of known users using the caller number. Users whose connections do not transmit a caller number (for example analog telephones) can call an MSN that is set up especially for them.

Callback

All users can be configured so that they can be called back. Thus, PPP connections are only possible from a predefined connection.

User Account and Password

After setting up a connection, the user account and password can be checked using PAP (Password Authentication Protocol), CHAP (Challenge Handshake Authentication Protocol) or MSCHAP (Microsoft Challenge Handshake Authentication Protocol.

HG 1500 V3.0 also supports these protocols as a client when dialing in to a RAS server (for example with an ISP).

IP Address Filter for Communication with the LAN

IP address filters can be defined to prevent attacks on devices in the LAN, both from insecure (external) networks and from within the LAN. When IP filtering is activated, access is only possible from address ranges that have explicit permission, and this access is only possible to specified addresses. Optionally, access can be further limited to a specific protocol port.

MAC Address Filters for Using the Gateway from within the LAN

MAC address filters can limit access to the router from devices within the LAN. When MAC filtering is activated, only devices within the LAN whose IP and MAC addresses have explicit permission to do so may set up a connection via the HG 1500 V3.0. (This function cannot be defined with dynamic IP address allocation in the LAN via BootP or DHCP).

Access Protection for Administrative Access

General administrative access and access to accounting data can each be separately limited to specific IP addresses, regardless of any other IP filters.

4.5.9.4 Multilink

The HG 1500 V3.0 can set up static or dynamic PPP connections with a remote station via several B channels simultaneously.

A static multilink uses the same number of B channels for the duration of the connection. A dynamic multilink adds or removes channels depending on current channel load. These parameters can be configured.

4.5.9.5 Short-hold

After a preconfigured time period with no data transfer over a PPP connection, the HG 1500 V3.0 can clear down the connection automatically.

4.5.9.6 IP Control Protocol (IPCP)

The HG 1500 V3.0 supports the IP Control Protocol (IPCP) for dynamic handling of IP addresses during connection setup.

4.5.9.7 Compression of IP Headers

Significant protocol overhead can develop, especially during voice data transmission where user data in a packet is typically short. To improve the situations, the HG 1500 V3.0 supports the compression of IP headers according to RFC 2507 and RFC 2508. The compression is negotiated during the configuration of the connection with the receiver in accordance with RFC 1332 and RFC 2509.

4.5.9.8 Data Compression

User data in a PPP connection can be compressed with the STAC or the MPPC algorithm. The compression for each channel is negotiated separately with the remote station.

For poor connections, we recommend using the MPPC algorithm, which is very useful for resynchronization.
Further information on both algorithms can be found in RFC 1974 (STAC) or RFC 2118 (MPPC)

4.5.9.9 IP Accounting

HG 1500 V3.0 saves information about transferred data for the purposes of IP connection accounting.

Accounting data is saved for:

- PPP connections via SCN
- DSL connections
- Routing via the LAN2 Ethernet interface

The following information is saved:

- Data volume (sent and received)
- IP addresses (sender and recipient)
- Port number of the recipient
- TCP or UDP protocol ID
- Time (start of transfer and last activity)
- For PPP connections: Address and station number of PPP peer

Reading the Accounting Data

The Accounting Server (ACC) saves the data in the gateway. This data can be read out by the IP Accounting Client – an application on a PC – by means of a TCP connection, and then processed - for billing, for example. The IP accounting
client is a supplementary product; instructions for its use are described in the accompanying documentation.

The IP Accounting Client must be connected to the gateway via a permanent IP connection.

To ensure data protection, a user name and password must be entered before the read-out. It addition, it is also possible to specify that reading is only
possible from certain IP addresses.

IP Accounting must be activated and the connection parameters set for the IP Accounting Client before it can be used. Both configurations are described in the HG 1500 V3.0 Configuration Manual.

4.5.9.10 VCAPI

PC software usually accesses ISDN lines via CAPI
(Common ISDN Application Interface). CAPI requires an ISDN adapter be directly connected to the relevant computer.

CAPI access is possible via local networks using VCAPI (Virtual CAPI). VCAPI functions according to the client/server principle: Client software is installed on the PC as a DLL and forwards all CAPI requests transparently to the server, which is a process on the HG 1500 V3.0.

This way, all PCs connected via a LAN to the gateway can transparently utilize all the CAPI-enabled software (e.g. CAPI-enabled software for Fax Group 3) in order to access the HG 1500 V3.0 ISDN connections, and do not need additional hardware.

Incoming connections can be forwarded directly to a PC's VCAPI client using up to 100 call numbers reserved for this purpose. Each station number is assigned to an IP address. To the CAPI software on that PC, these incoming calls appear to be calls on a physical local ISDN adapter.

The HG 1500 V3.0 VCAPI implementation supports CAPI 2.0.

4.5.9.11 Enhanced B Channels (HXGM3 with 2 × PDM1)

When the "Enhanced B Channels" feature is enabled in WBM, the board supports up to 32 B channels instead of the usual 16. Up to two PDM1 modules must be connected for this. The feature is supported in HiPath 3000 V3.0/V4.0 and HG 1500 V3.0 SMR4 or later.

Possible scenarios when using 32 B channels:

- networking two or more systems with IP trunking,
- mixed configuration with IP trunking and HFA clients,
- straightforward HFA scenario.

Restrictions when operating with 32 B channels per board:

- No VPN and no firewall functions are possible (when enabling the "Enhanced B Channels" feature in WBM, the VPN and firewall functionalities are automatically disabled). All other features (for example VCAPI) can be used after the "Enhanced B Channels" feature has been enabled.
- Channel bundling only up to a maximum of 16 B channels to the system for static and dynamic data-PPP-multilink connections (up to one B channel group with 16 B channels is permitted),
- Channel bundling only up to a maximum of 8 B channels to the system for static and dynamic Voice-over-PPP-multilink connections (up to one B channel group with 8 B channels is permitted),

4.5.10 Virtual Private Networks (VPN)

Virtual Private Networks (VPN) connect individual computers and local networks via the Internet to form a closed virtual network. Communication in a VPN is tunneled through the Internet (encapsulated) and is protected from tapping and access by third parties such as Internet users and providers that are not a part of the VPN. A VPN enables an intranet to be extended beyond the LAN, for example to home workstations or branch offices, without requiring a dedicated line.

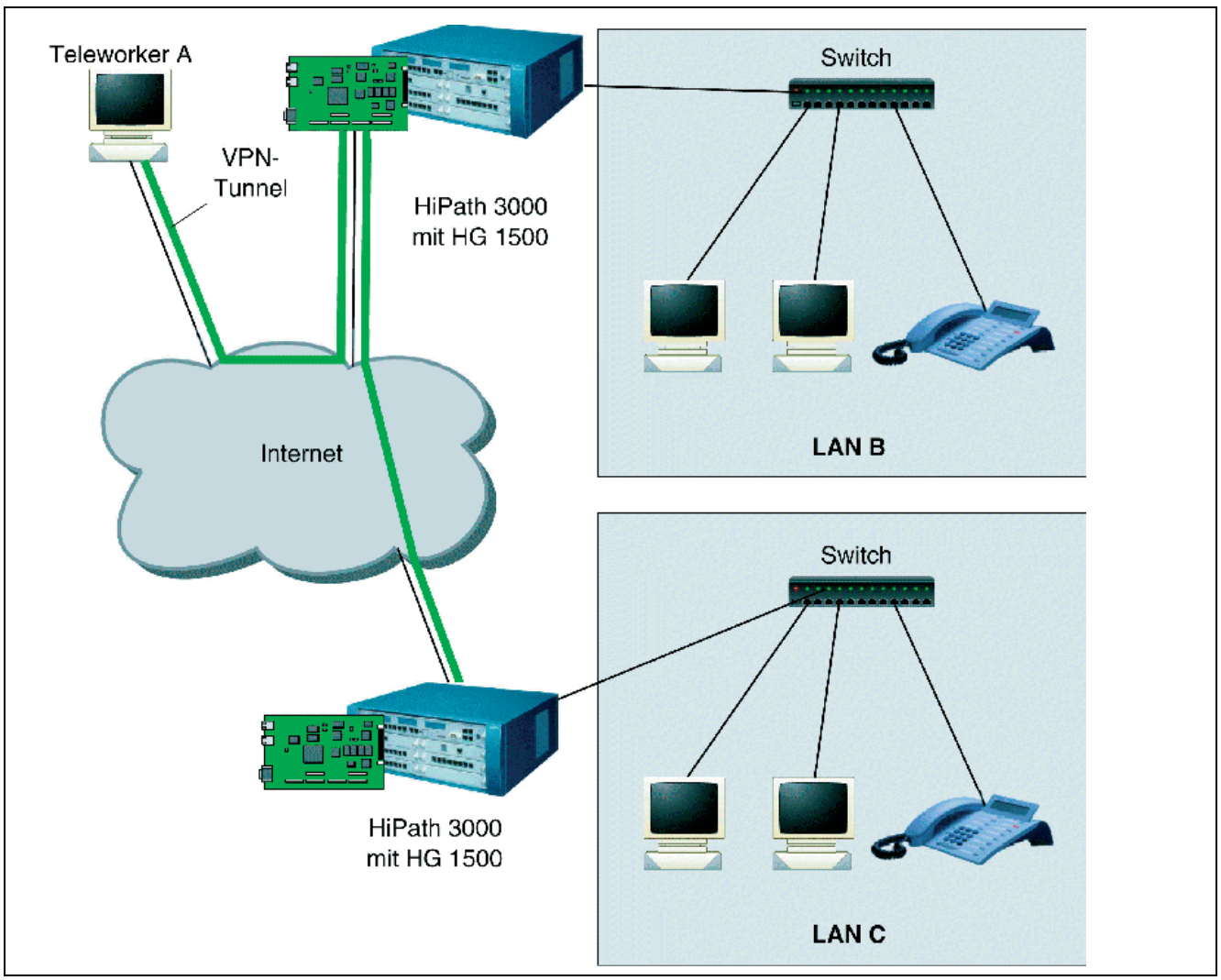


Figure 4-5 VPN – Configuration Example

A VPN provides the following key functions:

- The tunnel endpoints (gateway or teleworker PC) are reliably identified.
- Exchanged data is protected from tapping during transmission.
- Exchanged data is protected from being modified during transmission.

A VPN therefore guarantees that data actually comes from where it appears to have come from. that they are transferred from there unaltered; and that they are not made known to a third party on the way.

The HG 1500 V3.0 provides this function based on IPsec – a secure implementation of the IP protocol on level 3. This ensures that the VPN is transparent to applications as well as hardware.

The VPN security functions are available for LAN connections (for example LAN B and LAN C in Figure 4-5). In this case, they are completely transparent to the computers participating in the LANs. They can also be used for connecting individual computers (teleworkers), for example, teleworker A in LAN B in Figure 4-5). in this case, the VPN client software installed on the teleworker PC must be compatible with the VPN functions of HG 1500 V3.0.

A VPN (Virtual Private Network) is a network where communication is protected as far as humanly possible against tapping, clandestine modification and the misrepresentation of fake tunnel endpoints.

The required protocols are available in the HG 1500 V3.0. Before a VPN can be created, however, the gateway itself, and especially its administration, must be made secure against attacks.

4.5.10.1 Secure Mode

Unless special measures are taken, HG 1500 V3.0 operates in non-secure mode. This means, among other things, that administration access is not encrypted during transmission over the network.

The gateway recognizes the following security modes:

- Factory mode: has no configuration data.
- Insecure mode: gateway is configured, SSL and VPN are disabled. Insecure data transmission is possible.
- Activation of SSL: intermediate status between introduction of secure mode and configuration of SSL. Access is only possible via CLI at the V.24 interface; no data transmission is allowed.
- Secure administration: SSL is enabled. Access via CLI at the V.24 interface and WBM (via HTTPS) are possible. User data is transferred in insecure mode, and configuration data and software images are transferred in secure mode.
- Secure mode: SSL and VPN are active and configured. Access via CLI at the V.24 interface and WBM (via HTTPS) are possible. Secure and insecure data transmission are possible according to the security policy configured.

Since a gateway in insecure mode would represent a weak point in the VPN, it must be placed in secure mode before the VPN can be configured. This requires a certain degree of effort to prevent any hackers from getting into the system during this phase of the process and undermining the subsequent steps taken.

The following steps must be taken for the gateway to be in secure mode:

1. Connect a terminal (or a PC with a terminal emulation program) to the V.24 interface of the gateway.
2. Restart the gateway with the CLI command `reset secure`. When this is done, all user settings are lost and all user data transmissions are interrupted until the gateway is reconfigured.

   At this point, the gateway is in "activation of SSL" mode. In this mode it can only be configured using CLI at the V.24 interface – WBM, Telnet, HiPath 3000 Manager E and SNMP are disabled.
3. The gateway must be set up for SSL mode. First, the CLI command `create SSL certificate` must be used to generate a server certificate with which the gateway can identify itself to SSL clients. After that, SSL can be activated with the `enable ssl` command.

   At this point, the gateway is in "secure administration" mode and can only be configured using CLI at the V.24 interface or WBM via HTTPS – Telnet, HiPath 3000 Manager E and SNMP are disabled.
4. Start the browser for access to WBM and enter the gateway address with the protocol "https://" (you can enter the port number "443" after the gateway address). The browser displays the previously configured server certificate which must be manually checked and approved. It can now also be installed in the browser to avoid future requests for it.

Use WBM to set up the VPN as described in the following section.

4.5.10.2 Security Policy

The security policy determines the procedure for IP packets. The following actions are possible:

- rejecting
- forwarding (normal routing without VPN functionality)
- tunneling (forwarding over the VPN)

The handling of IP packets can be specified in the HG 1500 V3.0 according to IP address, port number and protocol (TCP or UDP). For tunneled packets, you must determine:

- which algorithms for encryption and authentication are permissible on the connection,
- the period of validity for the security association.

4.5.10.3 Security Associations

A Security Association (SA) combines an encryption algorithm and its parameters with a session key and the key's period of validity This ensures the security of a VPN connection session.

VPN connections with the HG 1500 V3.0 always require three SAs: one for initial mutual verification of identity and exchange of keys, and one for each direction of the connection once it is set up. The SAs are negotiated using the IKE (Internet Key Exchange) in accordance with RFC2409. The required keys are exchanged with the Diffie-Hellman algorithm using Oakley Group 2 or 5. Hash procedures available are SHA-1 and MD5.

HG 1500 V3.0 also supports key exchange using the Oakley Group 1. However, this is cryptographically weaker than the other supported groups 2 and 5 so we would therefore advise against using it.

Both the main mode and the aggressive mode are supported for negotiating the IKE security association. HG 1500 uses main mode if the peer also offers main mode. Teleworkers who use pre-shared keys must configure aggressive mode.

The period of validity for negotiated security associations can be limited by time or transmitted data volumes.

4.5.10.4 Tunnel

HG 1500 V3.0 supports up to 256 tunnels per board.

A tunnel is a secure VPN connection to another VPN gateway or a VPN client. The HG 1500 V3.0 establishes tunnels on level 3 based on IPsec.

Tunnel Configuration

For a tunnel to be set up, each terminal must be authenticated by the device at the other side. Otherwise an LDAP server is used. The HG 1500 V3.0 supports procedures that use public keys as well as procedures based on shared secrets – similar to passwords.

For authentication using public keys, the HG 1500 V3.0 can have CA (Certificate Authority) authentication certificates assigned to it manually. However, it can also obtain CRLs (Certificate Revocation Lists) automatically from an LDAP server.

The HG 1500 V3.0 supports X.509 certificates for authentication of VPN subscribers. The HG 1500 V3.0 supports DSA and RSA as public key algorithms.

HG 1500 V3.0 as Certification Authority CA

As long as no other CA is available, the HG 1500 V3.0 can, to a certain degree, act as a CA. It can generate pairs of public and private keys, issue and sign relevant certificates, and save keys and their corresponding certificates to files.

There is, however, no option to automatically transfer such certificates to clients; every such transfer must be manually performed – with disks, for example.

Any subsequent certificate management, such as monitoring the period of validity or allocating certificates to client data, must also be done manually.

The HG 1500 V3.0 can create CRLs (Certificate Revocation Lists) of certificates that are considered insecure and therefore are declared invalid before the end of the normal period of validity. These lists must be distributed manually.

HG 1500 V3.0 can work with certificates from external CAs. However, they can also issue certificates which can be used by other tunnel endpoints to authenticate themselves in a VPN. This function is called "Lightweight CA" and requires a separate license.

4.5.10.5 Data Security

The HG 1500 V3.0 supports ESP to protect utility data during transmission over the VPN.

DES, Triple DES (3DES) and AES are available as encryption algorithms.

HMAC-SHA1 and HMAC-MD5 are supported as MAC algorithms (MAC – Message Authentication Code).

The HG 1500 V3.0 supports X.509 certificates as well as DSA and RSA, two public key algorithms, and pre-shared keys for authenticating VPN subscribers.

4.5.11 System Client and H.323 Client

System Client

You can configure clients such as optiPoint 400 or optiClient 130 V4.0 with payload switching capability. While calls are signaled via HiPath 3000, voice transfer between two payload switching clients occurs directly via the LAN. Using this procedure saves DSP resources. The transfer can occur via HG 1500 V3.0 and across all nodes provided the required conditions are met by all the stations involved.

H.323 Client

A H.323 client on the network PC provides you with voice services that can also be used over the Internet (prerequisite: fixed IP addresses for all subscribers and the HG 1500 V3.0). No HiPath 3000 features are supported.

4.5.12 Bandwidth Management

Bandwidth management controls the bandwidth for Voice over IP between two nodes with HG 1500 V3.0 which are routed via ISDN (not usually required for LAN connections).

Five simultaneous calls can be made via one B channel if the audio codec is set to "G.723". However, the standard packetizing setting must be increased from 1 to 3. An additional B channel is automatically set up from the sixth call onwards (prerequisite: two or more channels are entered for the ISDN partner). RTP compression is determined automatically and it cannot be configured.

If data is transferred to a routed ISDN channel at the same time as Voice over IP, the "MTU Size Fragmentation" of the relevant ISDN partner must be activated.

The compression of IP headers can be activated and the "PPP Default Header" can be deactivated to save additional bytes.

The value for packetizing should be set to three when Voice over IP and data transfer are performed simultaneously.

The entire bandwidth can be split between voice and data or reserved.

4.5.13 Displaying, Adding and Configuring PKI Servers

If you want to create a PKI (Public Key Infrastructure), you must configure suitable PKI servers in HG 1500 V3.0. PKI server data includes the server's name and IP address and the server type (LDAP).

4.5.14 Telematics Using the VCAPI Client

Principle of Virtual CAPI (VCAPI)

Today all users can access an ISDN card integrated in a network PC or server by installing a "virtual CAPI interface" (VCAPI) in their PCs to emulate the existence of a local ISDN card.

With respect to PC applications, the virtual CAPI interface behaves for the most part like a CAPI interface supplied with an ISDN card. The difference is that the virtual CAPI does not forward the functions activated by the application directly to the card, but rather converts them into a data packet and outputs them to the LAN (client/server principle).

A virtual ISDN card is provided by HiPath 3300/3350 or HiPath 3500/3550 or HiPath 3700/3750 to save one or more ISDN cards. A virtual CAPI interface with the previously described functionality is installed on all network PCs (CAPI client). The messages sent by the PCs via the virtual CAPI are evaluated on HG 1500 V3.0 (CAPI server). This information is subsequently used to set up one or more B channel connections for the required service and to process the selected protocol.

A number of DID numbers (max. 100) must be made available to HG 1500 V3.0 for incoming calls. Each of these call numbers must be mapped to a network address to allow an incoming call to be switched specifically to one of the virtual CAPI interfaces. The virtual CAPI reconverts the Ethernet packet into the appropriate CAPI messages.

4.5.14.1 VCAPI and Smartset

Smartset is an optional CTI client which provides your PC with features such as associated dialing from a telephone directory, caller identification using the telephone directory, answer groups and a caller list. Documents can also be opened automatically for incoming ISDN calls. Smartset exchanges data with your Windows applications using DDE functions.

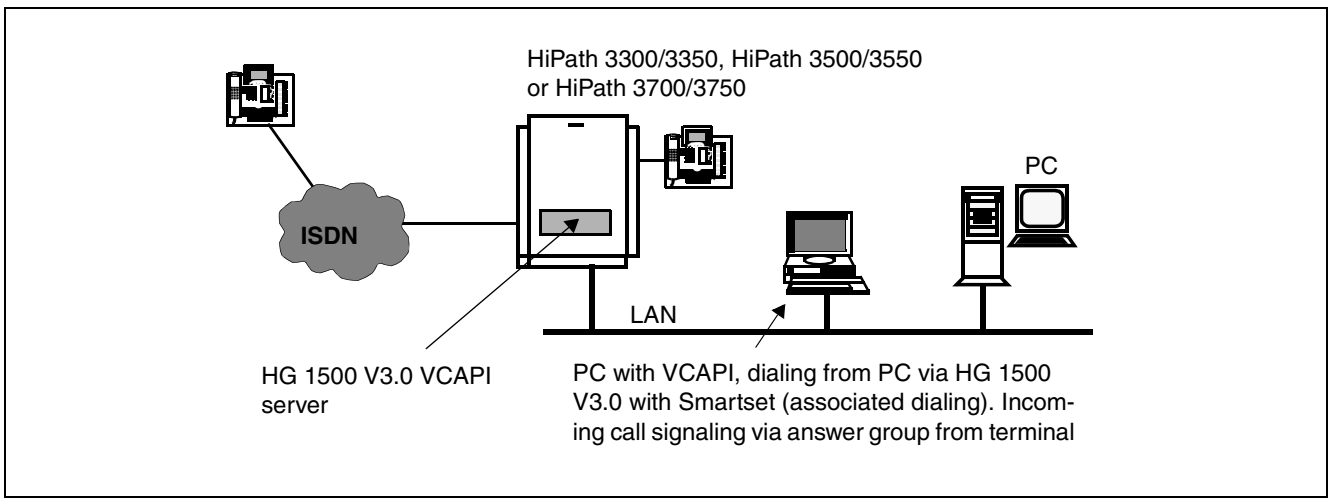

HiPath 3300/3350, HiPath 3500/3550
or HiPath 3700/3750
PC
ISDN
LAN
HG 1500 V3.0 VCAPI
server
PC with VCAPI, dialing from PC via HG 1500
V3.0 with Smartset (associated dialing). Incoming call signaling via answer group from terminal

Figure 4-6 VCAPI and Smartset

4.5.15 VCAPI and TAPI

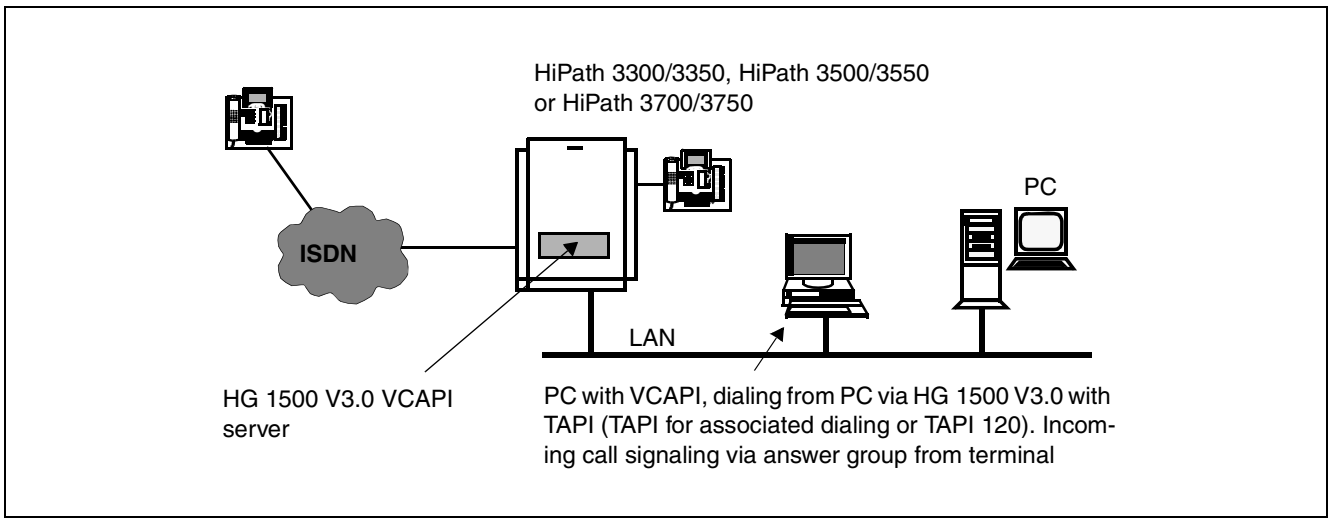

HiPath 3300/3350, HiPath 3500/3550
or HiPath 3700/3750
ISDN
PC
LAN
HG 1500 V3.0 VCAPI
server
PC with VCAPI, dialing from PC via HG 1500 V3.0 with
TAPI (TAPI for associated dialing or TAPI 120). Incom-
ing call signaling via answer group from terminal

Figure 4-7 VCAPI and TAPI

TAPI clients

Automatic dialing can also be implemented using the VCAPI-based TAPI and an application that supports TAPI. An example of this would be dialing one of the station numbers saved under "Contacts" in Microsoft Outlook.

Note that in Outlook, call numbers must be specified in international format, for example. +49(2302)999420.

TAPI for associated dialing

Associated dialing must be enabled in HiPath 3000 if TAPI functionality is to be used.

The answer group feature must be configured for the TAPI station telephone.

TAPI 120

TAPI 120 enables up to six users to use HiPath 3000 telephony services directly via CSTA. TAPI 120 has more features than TAPI for associated dialing. For example, it allows a TAPI subscriber to hang up.

TAPI 120 is enabled via VCAPI and IP and is limited to six clients. A CMD (CSTA Message Dispatcher) is required to be able to use more than six TAPI 120s.

In the first case, CSTA is tunneled in the CAPI protocol.

4.5.15.1 VCAPI and Fax

You can send and receive faxes via the HG 1500 V3.0 VCAPI. To do this, you need an optional CAPI-based fax software.

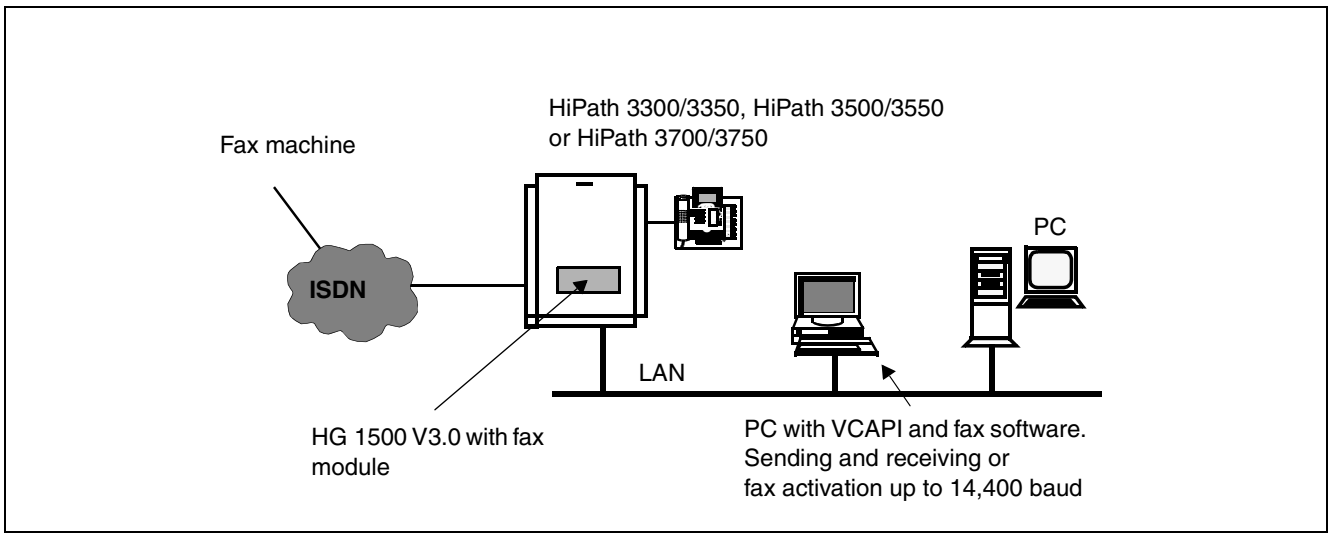


Figure 4-8 VCAPI and Fax

Fax services with HG 1500 V3.0

- Each PC has a separate fax DID number
- Group 3 fax machines send and receive at a speed of 14,400 bauds
- Fax activation in receive direction
- Fax forwarding possible on no answer and busy to analog fax (for example if a PC is switched off)
- No B channel reservation (the channel can be used by other applications when no fax is being sent or received).
- Depending on the system type and the number of boards, up to nine simultaneous faxes are possible.

If you want to use CTI and fax functions simultaneously at your client PC, an individual station number should be allocated for each service. Otherwise problems could arise during call pickup.

4.5.15.2 VCAPI and File Transfer

File transfer enables direct data exchange with your ISDN peer. This is possible using any software with the Euro File Transfer standard, or using the same proprietary software on both sides.

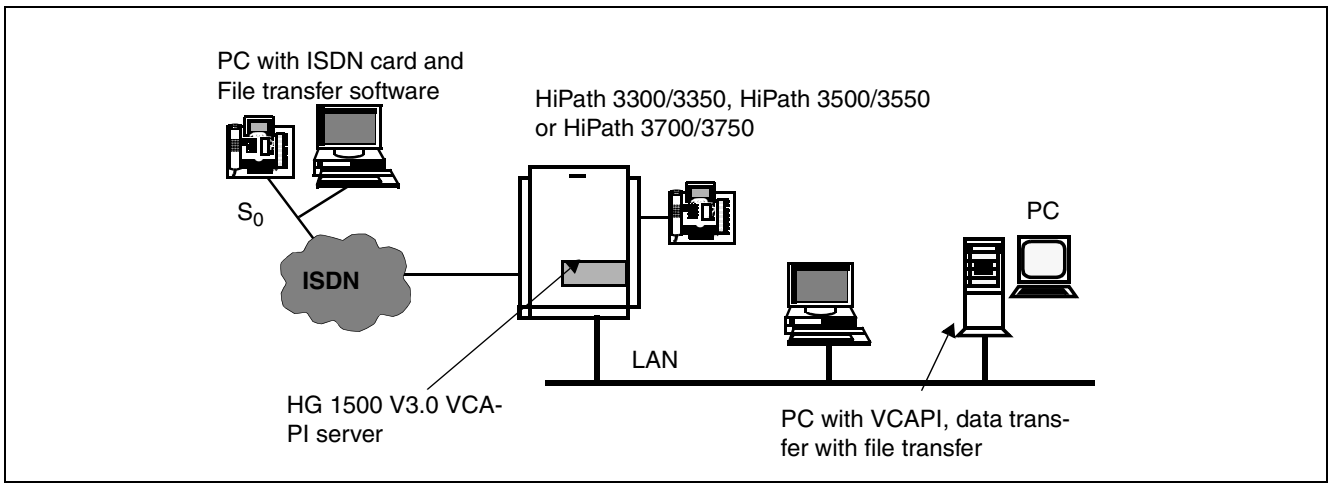


Figure 4-9 VCAPI and File Transfer

4.5.15.3 VCAPI and Internet

Internet access via VCAPI is only necessary if your service provider's access software requires the CAPI interface.

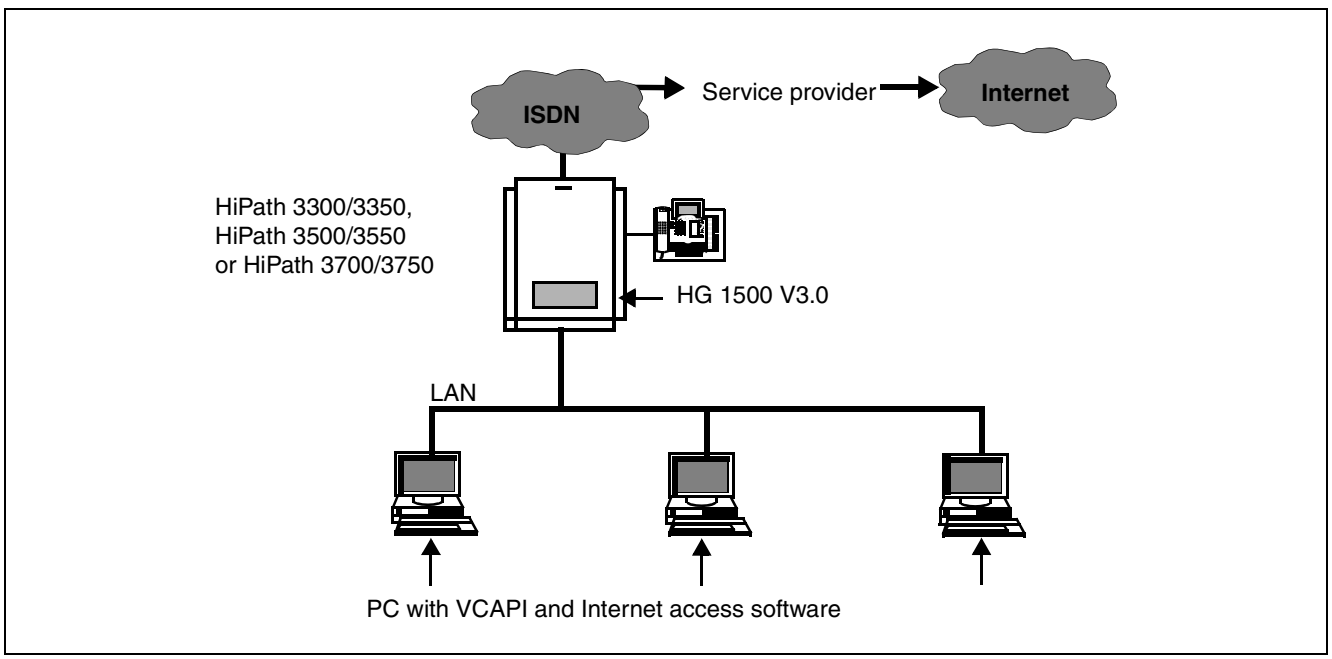


Figure 4-10 VCAPI and Internet

Internet access is also possible via routing.

4.5.16 Routing

LAN-LAN and teleworking

LAN-LAN connections, that is WAN connections, can be set up with HG 1500 V3.0 to other HG 1500 V3.0 and HiPath 3000 LAN-Bridge 1.x and other routers. Routing also enables access to Internet providers.

The IP Accounting feature describes the option of allocating Internet access costs on the basis of their origin according to the transferred quantity of data and the various tariff models stored in the application.

HG 1500 V3.0 performs channel bundling: In the first case, CSTA is tunneled in the CAPI protocol.HiPath 3300/3350 offers a maximum of eight B channels at the CO.

IP is supported as the transport protocol.

In the case of HG 1500 V3.0 with two LAN interfaces, routing is also possible between the two LAN interfaces.

Features

- PPP connections (LAN-LAN connection and teleworking)
- PPP multilink connections (channel bundling)

Firewall mechanisms

- Verification of MAC or IP addresses
- TCP, UDP and ICMP port firewall
- Access control using ISDN call numbers
- Automatic callback
- PAP (Password Authentication Protocol)
- CHAP (Challenge Handshake Authentication Protocol).

A teleworking station requires an ISDN card with remote access software (for example Dial-Up Networking). A network connection to HG 1500 V3.0 is established via the ISDN card.

Access to the local networks can be established via the following connections:

- Analog V.34 (max. 33,600 bps)
- Analog V.90
- ISDN DSS1
- GSM V.110

- V.90 (max. 56,000 bps)

Routing with HG 1500 V3.0

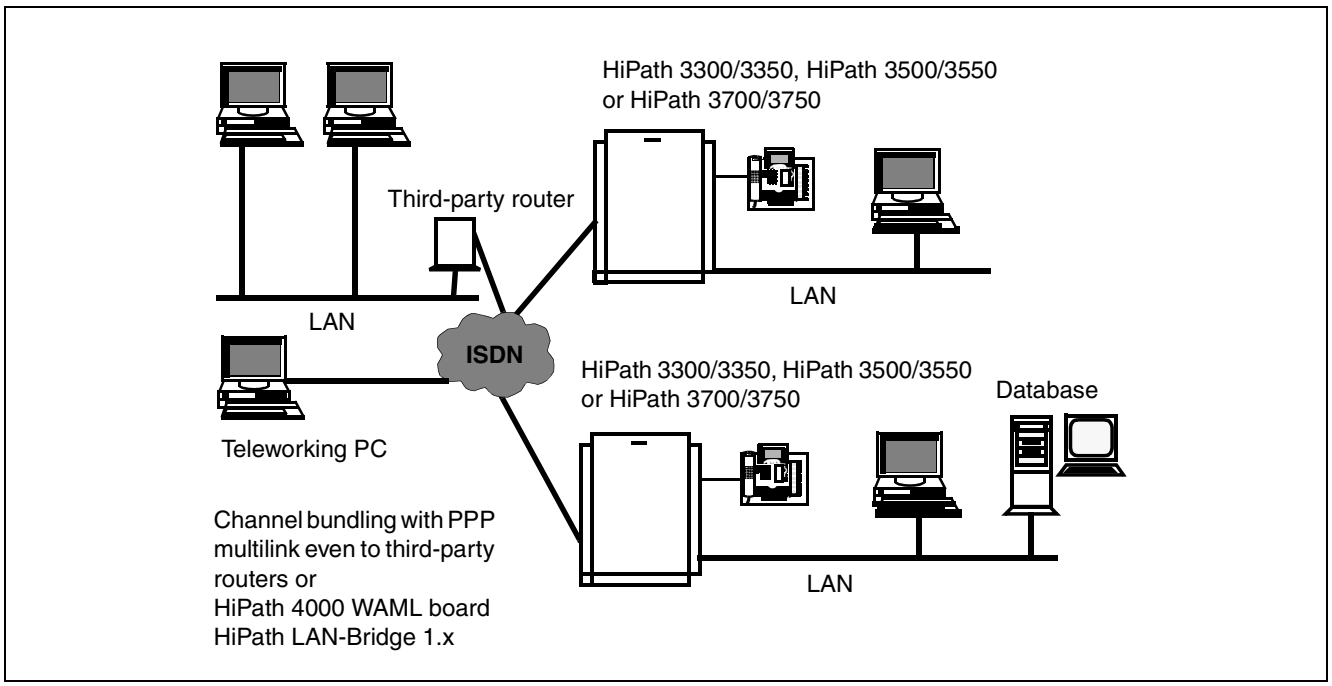


Figure 4-11 Routing with HG 1500 V3.0

4.5.17 Call Charge Allocation and Callback

If HG 1500 V3.0 establishes an ISDN trunk call, the charges incurred are allocated to the station number used. As long as this physical connection exists, data can be transferred in both directions. If a connection exists between HG 1500 V3.0 A and HG 1500 V3.0 B via the trunk, all HG 1500 V3.0 A and B devices connected to the LAN can avail of the connection. In this case, the charges are allocated to the station number of the HG 1500 V3.0 A board port which established the connection.

As is standard with today's routers, call charges can only be allocated to the router station number and not to specific LAN devices or applications.

Even if the physical connection is cleared down via "short hold", it is reestablished when new messages are received. If the data from HG 1500 V3.0 is B to A, thisHG 1500 V3.0means that B initiates the connection and therefore, the call charge allocation for B also changes.

When the "Callback" function is activated, charges incurred by the called HG 1500 V3.0 are allocated, as this called party rejects the incoming call and actively re-establishes the connection (callback without a connection). In other words, no B channel is set up. Identification is performed via the station number entered in Setup or, in the case of analog stations, via the DID number entered under "ISDN peer".

In some cases (for example when short hold is deactivated), dial-up connections can be only be initiated manually.

4.5.18 Internet access

One or more client PCs can directly access the Internet using a Web browser. The connection from the LAN is set up via ISDN or DSL. In general, access is possible from all PCs. (Please note that this is not allowed for all tariffs of every provider.)

Internet access takes place via the HG 1500 V3.0 to the Internet provider, using the IP transport protocol.

All clients use the same provider.

Features

- Static or dynamic IP addresses
- Routing function with NAT/SUA (Network Address Translation/Single User Access)
- PPP multilink (channel bundling)
- PPPoE (for DSL)
- PPTP (for DSL)
- PAP (Password Authentication Protocol)
- CHAP (Challenge Handshake Authentication Protocol)

4.5.18.1 HG 1500 V3.0 and Access to the Internet via a Network Provider

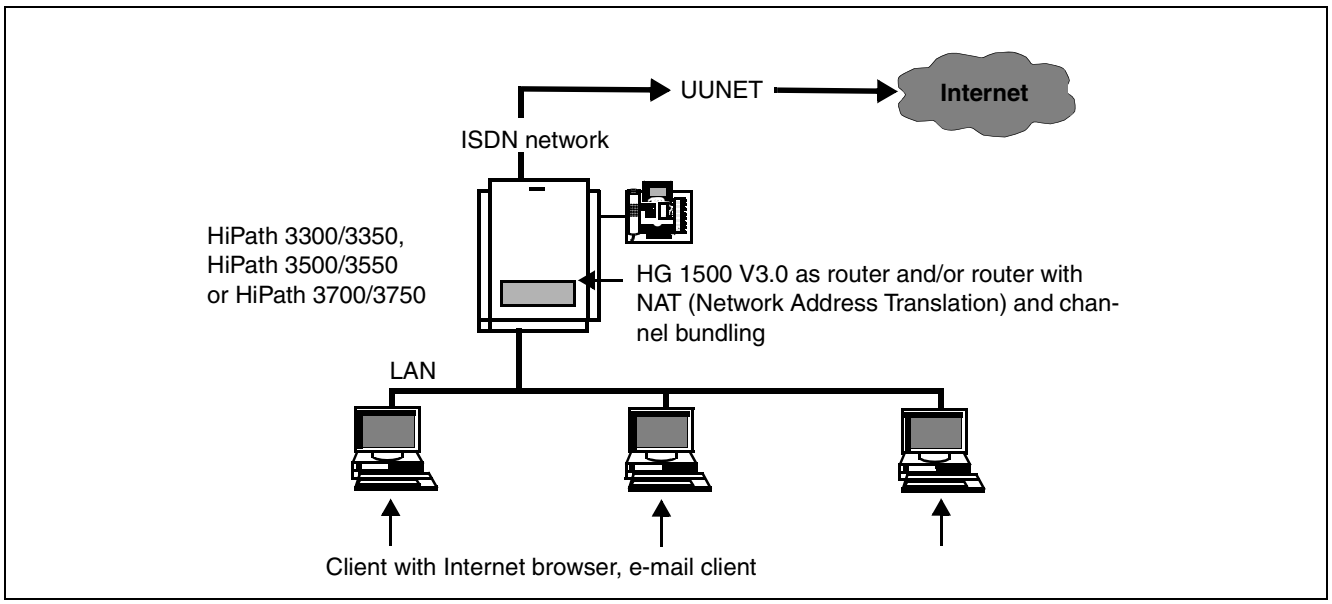


Figure 4-12 Internet Access via a Network Provider

4.5.18.2 Internet Access via T-DSL (T-ISDN DSL)

At the end of 1999, Deutsche Telekom AG launched a new product (T-ISDN DSL, also known as T-DSL) which combines fast Internet access with enhanced T-ISDN telephony features. (Other providers, for example, in the Netherlands, use DSL with the PPTP protocol).

T-ISDN DSL is first and foremost a normal T-Net or ISDN connection as a multi-device or system connection.

Over and above the functions of the normal T-Net or ISDN connection, the T-DSL connection has a data interface for Internet connections with a speed of 768 Kbps downstream and 128 Kbps upstream. The use of this data interface does not seize any T-Net or ISDN channels.

Function

In contrast to T-ISDN, the NTBA is not connected directly to the main station but rather downstream of a splitter (BBAE). This device can be seen as a DSL-speed distributor between the ISDN connection and data transmission.

The splitter has a TAE jack to which the NTBA is connected. The connection to the HiPath 3000 is set up in the conventional manner.

In addition, the splitter features a connection for the T-DSL modem (NTBBA) which provides the interface for data transmission at T-DSL speed.

The T-DSL modem is connected to the board via a 10BaseT interface. The PPPoE (Point to Point Protocol over Ethernet) protocol is used for the connection.

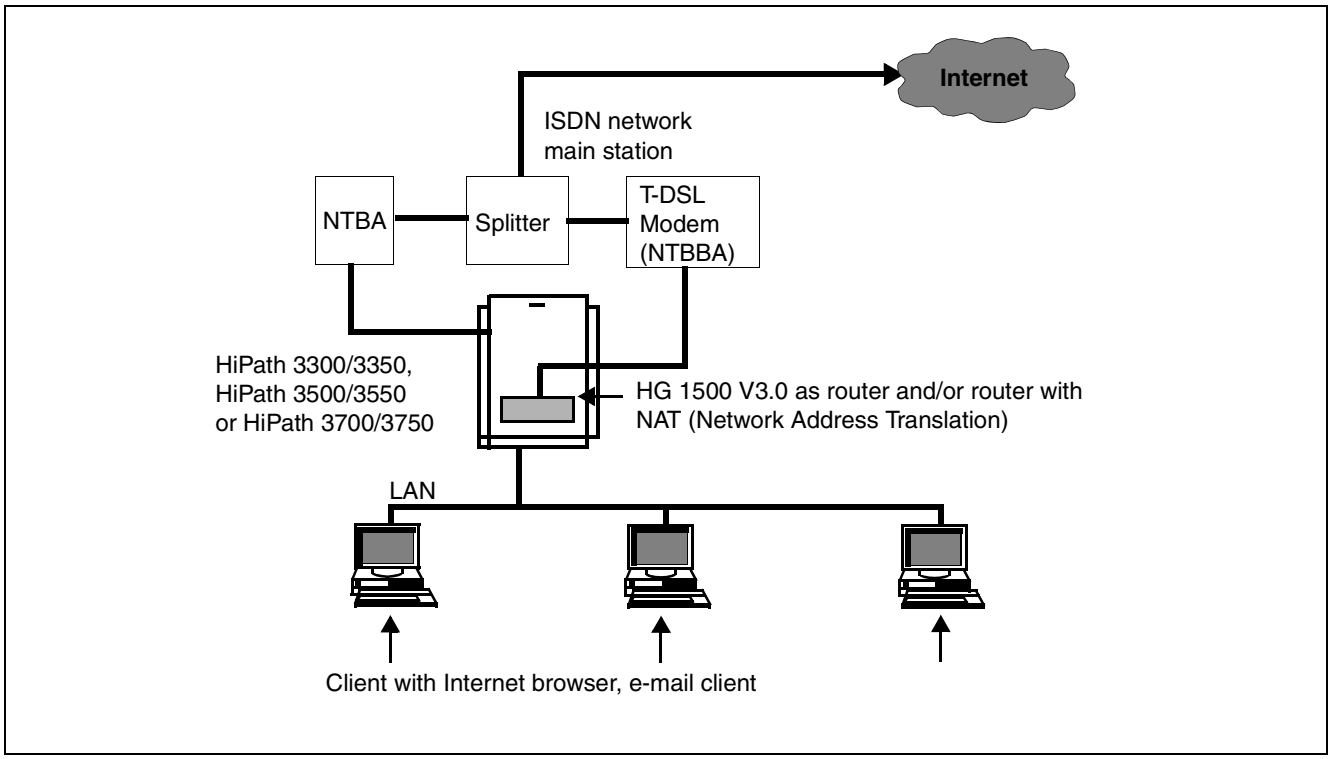


Figure 4-13 Internet Access via T-DSL

4.5.18.3 IP Address Mapping

With the expansion of the Internet, it has become common practice to use the short but globally unique IP addresses exclusively for the Internet and to revert to private (not public) IP addresses for IP networks within companies.

Consequently, addresses from the same IP network can frequently be used in many companies.

The "IP address mapping" feature was developed to enable users to reach these addresses via a unique routing entry despite the multiplicity of entries.

When routing to specific partners defined during configuration, HG 1500 V3.0 exchanges the private IP addresses used in its own LAN for other IP addresses and can in return be contacted by external users via these IP addresses.

4.5.19 Remote control

Teleworking with HG 1500 V3.0 and pcAnywhere

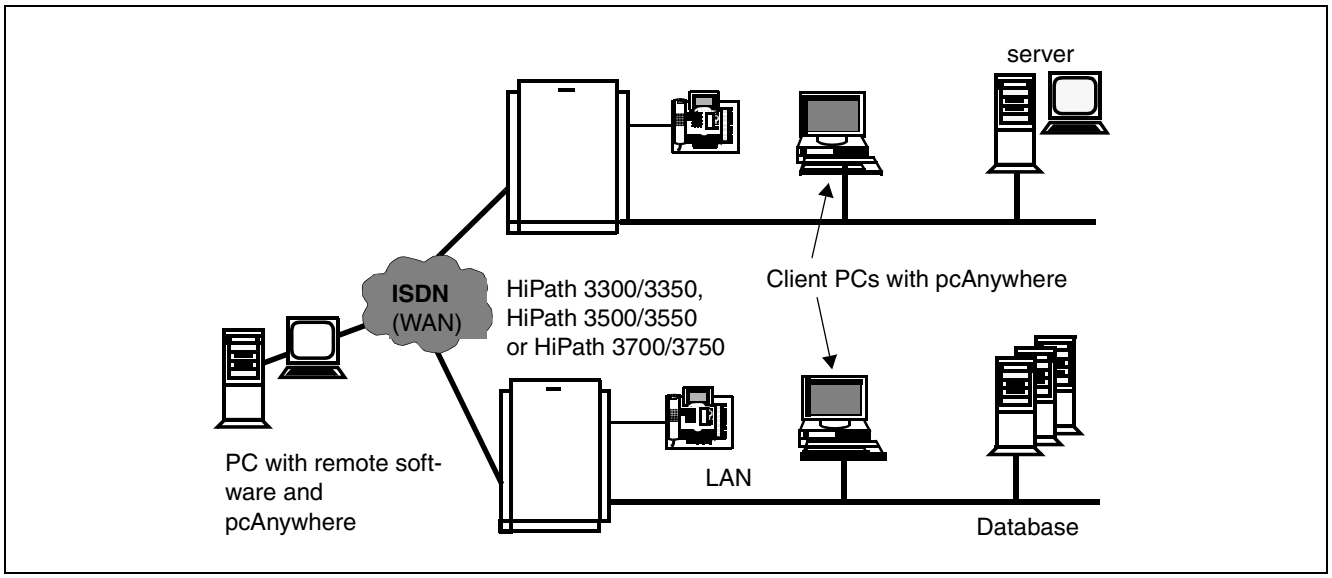


Figure 4-14 Telecontrol with pcAnywhere

Symantec's pcAnywhere software enables remote operation of a PC in the network from an external PC.

Prerequisite:

- Windows 98/ME, Windows NT 4.0, 2000 or XP as the operating system
- Connection setup with the IP transport protocol
- PC is operational (if applicable, screen is dark)

4.5.19.1 Safety Mechanisms ("Security")

An access authorization for the routing function is required in order to control access via HG 1500 V3.0 from the internal LAN to the ISDN and vice versa.

A firewall is not practical for telematic functions. Rules for these functions (for example trunk access) and their call numbers can be saved in HiPath 3000.

The following information is intended specifically for the router (HG 1500 V3.0).

Station number verification (incoming only)

Verification of the station number of the calling station (station authentication, configurable) and the IP address to prevent unauthorized external connections via ISDN.

Verification of the IP address (configurable) of internal LAN subscribers.

4.5.19.2 Firewall

A firewall is a barrier which protects against unauthorized access. In this case, the internal LAN (LAN1), for example, is to be protected against external access (such as Internet-based access via DSL).

The objective of a firewall configuration is to allow individual, specified computers to access an insecure network (for example Internet). At the same time, it prevents access in the reverse direction (from the Internet to these computers). The board features two different protection mechanisms for implementing this security.

The firewall in this case is a so-called authorization firewall. In other words, as soon as the firewall is activated, only configured components can access board services. All board services are automatically denied to unregistered LAN components.

WARNING: The activation and deactivation of firewall parameters may severely restrict the functionality of the board (for example LAN-based administration may not be possible any more) or may enable access to sensitive data.

Firewall (Permit Firewall)

In the case of a permit firewall, only configured components can access board services (when the firewall is activated). All board services are automatically denied to unregistered LAN components. The board features different protection mechanisms for implementing this security.

- **Stateful packet filtering for communication with the LAN**
  Stateful packet filtering analyzes and, if necessary, rejects packets based on their source and target IP address addresses and the ports used (TCP, UDP, and ICMP port firewall). The IP addresses can be network addresses or individual hosts.
- **Denial of Service Protection**
  Denial of Service Protection offers protection against a broad variety of Denial of Service attacks (and other attacks on the network gateway) such as SYN flooding, various fragmentation attacks, TCP hijacking (various active attacks, e.g. ARP spoofing), LAND (identical source and destination IPs), Christmas Tree attacks (all TCP flags are set), etc.

- MAC verification

  MAC address filters can limit access from devices within the LAN. If MAC filtering is enabled, devices such as these can only set up connections from the LAN via HG 1500 V3.0 whose IP and MAC addresses are explicitly released for this purpose.

An external firewall should be used if the demands for security on the firewall are higher (for example, if Internet and VPN traffic is being transferred to Internet gateways at the same time).

4.5.19.3 Alive Monitoring with Keep Alive

The Keep Alive Test is used for HXG3 boards located in different network nodes. This test sends a ping signal to the other HXG3 boards and then waits for a return signal. If a return signal is not received from an HXG3 board (for example, because the IP connection is down) then the board is considered out of service. If this happens during call setup, a message is sent to the HiPath 3000 to set the call up again.

The connection is automatically cleared down if the connection exists already and the Keep Alive Test fails. This is especially important for data connections to ensure that the applications involved can react appropriately and do not stall.

4.5.20 Overview of Management Tools

The following four different tools support administrators in performing their tasks:

- **Web-Based Management** (WBM) via an integrated HTTP server

  Provides a step-by-step configuration and easy access to all management functions. WBM is the primary management tool.

- **Command line** (CLI) via a serial V.24 interface or Telnet

  The command line is designed as the secondary management tool and provides a limited function scope. It can be used to modify certain configuration data, update and restart the system and to diagnose the system configuration.

  Security-relevant settings (such as SSL configurations) cannot be made via Telnet.

- **SNMP-supported management** via an SNMP agent

  SNMP-supported management enables gateway integration in network management systems. Systems like this can manage devices from other manufacturers.

  HG 1500 V3.0 supports SNMP version 1. Information such as statistics can be read and some important data can be modified using SNMP. Traps are also supported.

- **HTTP applications** via a command interface

  HG 1500 V3.0 configuration data can be read out and modified and commands can be executed via the HTTP port. This applies to insecure (HTTP) and secure (HTTPS) connections.

  The Universal Resource Identifier (URI) in the HTTP sequence is recognized by the gateway board as an administration command. The HTTP header contains information required for authentication.

In addition to the HG 1500 V3.0 management tools, the HiPath 3000 Manager E is available.

- **HiPath 3000 Manager E**

  The HiPath 3000 Manager E is an independent application installed on a PC. It displays the relevant parts of the network as a virtual HiPath system. (Some HG 1500 V3.0 settings can be configured both with this application and HG 1500 V3.0 tools, depending on the version of the HiPath environment.)

4.5.20.1 Multi-Gateway Administration (MGA)

The configuration of a large number of gateways, in particular, can cost administrators considerable time and effort, and so can – even only minor – modifications to a configuration.

HG 1500 V3.0 therefore supports the distribution of configurations from a master gateway to any number of slave gateways.

Prerequisites

In order to use Multi-Gateway Administration (MGA), no special hardware or software prerequisites are required on the gateways involved. However, the following conditions for configuration must be met:

- All slave gateways must be able to be accessed by the master gateway via IP.
- The port used for WBM must have the same number on each gateway (usually 8085) and must be accessible from the master gateway. Therefore, access must not be blocked by a firewall, for example.
- All slave gateways must have a user access for MGA. All accesses must have the same name and password. This access must have root access privileges.
- The slave gateways must be entered on the master gateway. (The list of slave gateways can also be imported by another master gateway, if necessary)

Using MGA

The administrator first configures the master gateway as required. He then uses a command to transfer this configuration data to slave gateways. The administrator can specify individually to which slave gateways the data will be transferred and also select which configuration tables will be transferred.

4.5.21 Quality of Service in HG 1500

Quality of Service encompasses various methods for guaranteeing certain transmission properties in packet-oriented networks (IP).

It is thus important, for example, to ensure a minimum bandwidth for Voice over IP for the entire duration of the transfer operation. If multiple applications with equal rights are operating via IP, then the available bandwidth for the transmission path (for example an ISDN B channel, 64 Kbps) is split. In this case, a voice connection may experience packet losses which can reduce voice quality.

HG 1500 V3.0 uses various different procedures to implement Quality of Service.

On layer 2 (in accordance with OSI, Ethernet), you can activate an extension (IEEE 802.1p) to the standard Ethernet format (DIX V2). This adds more information to the Ethernet header including a 3-bit data field. This field carries priority information on the data packet. For all packets that reach the board from the LAN, both Ethernet formats (IEEE 802.1p and DIX V2) are understood; for all packets that are sent from the board to the LAN, the format can be selected via "Basic Settings > IEEE 802.1p". You should check whether all components in the network support this format before this parameter is activated. Otherwise, it may not be possible to access HG 1500 V3.0 from the LAN anymore.

The Ethernet header is not transported when switching to another transport medium (for example ISDN). An IP router (like the HG 1500 V3.0's router) can, however, use the information contained in the IP header for prioritization. Straightforward IP routers that connect two network segments, for example, can use the IP level prioritization. In the "Type of Service" field, either three bit (IP precedence based on RFC 791, older standard) or six bit (Differentiated Services or DiffServ, based on RFC 2474) are evaluated for the creation of various classes. HG 1500 V3.0's IP router provides various bandwidths for these classes, so that voice packets can be processed first. The procedure adopted by HG 1500 V3.0 can be set under "Basic settings > QoS procedures" (Autodetect is set by default).

For the DiffServ parameter, various so-called codepoints ("Basic Settings > AF/EF Codepoints") are defined, and based on these codepoints two different procedures are used for processing the payload of different marked data flows:

The "Expedited Forwarded (EF)" procedure (based on RFC 2598) guarantees a constant bandwidth for data in this class. If this defined value is reached, all packets that exceed this bandwidth are rejected. A separate class is defined for EF on HG 1500 V3.0. For this class, the bandwidth can be defined as a percentage for every ISDN peer (QoS bandwidth for EF).

The "Assured Forwarding (AF)" procedure (based on RFC 2597) guarantees a minimum bandwidth for the data of one (of many) classes. Lower priority classes share the bandwidth not used by EF or the classes with higher priority. In addition, the speed at which packets are rejected if the system is unable to forward them fast enough can be defined for every class by means of the Dropping Level setting. Nothing is thus to be gained by buffering voice packages for an extended period of time (this only increases the delay). In the case of secure data transfer (for example file transfer), on the other hand, a large buffer is advantageous as packets are otherwise sent repeatedly between the two terminals.

Four classes are reserved for AF on the HG 1500 V3.0: AF1x (high priority), AF2x, AF3x and AF4x (low priority), where "x" stands for one of three dropping levels: low (1), medium (2) and high (3). In the case of "low", packets are buffered over an extended period, in the case of "high", packets are promptly rejected if they cannot be forwarded. Unmarked IP packets (ToS field=00) are handled in the same way as the lowest priority.

If a routing partner can only work with one of the two standards (DiffServ or IP precedence, for example an older router that only works with IP precedence), then HG 1500 V3.0 can translate the ToS field accordingly. This can be set for each ISDN partner or DSL/LAN2/PPTP inter-

face via "QoS Capability". When the default value is set ("identical"), nothing is translated; with the values "DiffServ" or "IP Precedence", translation is performed on the basis of the table below, if data is not entered in the field in accordance with the standard set.

In the case of IP data traffic, the IP packets that generate HG 1500 V3.0 are split into five groups (for example the VCAPI server, H.323 gateway). You can set which codepoint is to be used for marking the packets for four of these groups. This is configured under "Basic Settings > QoS priority classes":

- Voice Payload for H.323 telephony (Voice over IP)
- Call Signaling for connection setup in H.323
- Data Payload, for example, for IP networking with fax or modem
- Network Control, for example, SNMP traps

The remaining data traffic is marked "disabled", that is 00.

The following table shows the relationship between the various codepoints of DiffServ, IP precedence and the "User Priority" field in the Ethernet header.

IP header									**Ethernet header**
DiffServ						vs.	IP Precedence		IEEE802.1p
Code-point	Default (can be changed)		Drop level				Assignment (fixed)		
	Binary (bit field)	ToS field (hex)	high	med	low		Binary (bit field)	ToS field (hex)	User Priority (binary, bit field)
CS7	111000	E0		x		<->	111	E0	111
AF 11	001010	28			x	->	110	C0	110
AF 12	001100	30		x		<->	110	C0	110
AF 13	001110	38	x			->	110	C0	110
AF 21	010010	48			x	->	101	A0	101
AF 22	010100	50		x		<->	101	A0	101
AF 23	010110	58	x			->	101	A0	101
AF 31	011010	68			x	->	100	80	100
AF 32	011100	70		x		<->	100	80	100
AF 33	011110	78	x			->	100	80	100
AF 41	100010	88			x	<->	011	60	011

Table 4-15 Codepoint Implementation

IP header									Ethernet header
DiffServ						vs.	IP Precedence		IEEE802.1p
Code-point	Default (can be changed)		Drop level				Assignment (fixed)		
	Binary (bit field)	ToS field (hex)	high	med	low		Binary (bit field)	ToS field (hex)	User Priority (binary, bit field)
AF 42	100100	90		x		<->	011	60	011
AF 43	100110	98	x			<->	011	60	011
EF	101110	B8				<->	110	C0	110
DE (default)	000000	00					000 001 010	00 20 40	000

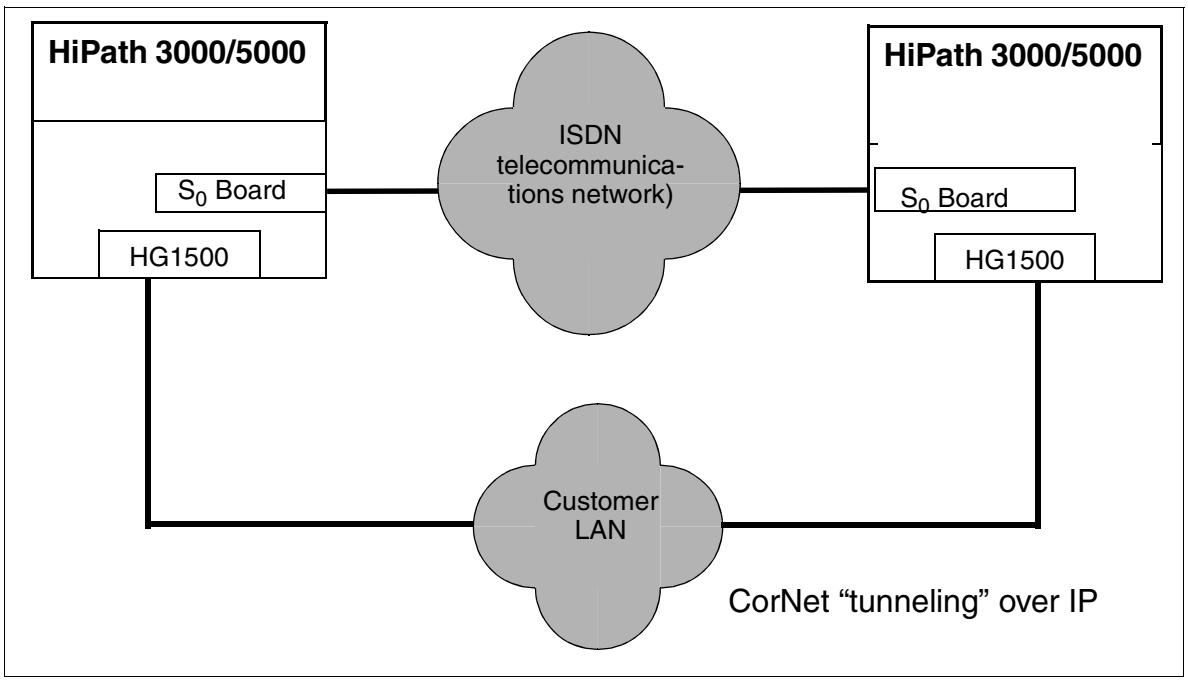
Table 4-15 Codepoint Implementation

The "vs." column shows the relationship between the DiffServ and IP precedence standards. Since DiffServ offers more variants, the codepoint is permanently selected when translating IP precedence into DiffServ: for example, the codepoint for the IP precedence "100", for example, becomes "AF31". In the case of packet that leave HG 1500 V3.0 in the direction of the LAN, the user priority specified in the last column is set when IEEE 802.1p is active.

QoS can be activated for the second LAN interface as well as for the ISDN partner. For this interface, the interface is extended by an additional transmission rate limitation. The function of the quality evaluation corresponds to the ISDN peer procedure. The average transmission rate is set in configuration data.

4.6 IP Trunking

4.6.1 Overview



The implementation of IP telephony between the HiPath 3000/5000 communications platforms has several advantages for our customers such saving on expensive leased lines for telephony only, the convergence of communications networks for voice and data over several locations, a standard contact partner for the infrastructure and other advantages.

The main advantage for users of IP telephony is a significant saving on costs by using **a single** infrastructure for data and voice. This advantage can be even further expanded by using the voice compression procedure, Compression enables existing lines to be used much more effectively. For example, up to three calls can be conducted simultaneously on a single ISDN channel if an optimized compression algorithm is used. A considerable reduction in costs can be expected particularly for companies that already have a broad-band intranet. IP trunking is available over the integrated ISDN router HG 1500 voice/data (Hicom Xpress@ LAN Data/ Voice).

- max. 16 channels per HG 1500 V2
- max. 64 nodes for 1000 subscribers per network

HG 1500 has been extended to include the following features:

- Quality of Service (IEEE 802.1d)
- Type of Service (RFC 791)
- Differentiated Services (RFC 2474)
- Assured Forwarding, AF (RFC 2597)
- Expedited Forwarding, EF (RFC 2598)
- Compression to ITU G.723.1 or ITU G.711, adjustable

Compression to ITU G.723.1 and QoS IEEE 802.1 d can be adjusted for each board. The B channels used for networking, the channels for routing and the channels provided for the IP clients are shared out amongst the total number of available B channels.

4.6.2 Features of IP Networking

Transparency for End Users

- Special workpoint clients (terminals) are not required because voice data is not converted into IP packages in the workpoint client, but rather in the LAN gateway.
- Network-wide features are transferred which means that use of the workpoint clients has not changed and consequently, the user-friendliness of the telephone has not been affected.
- DTMF signals are supported. Consequently, you can perform suffix-dialing or listen to your voicemail over the IP network.

Fax (Group 3) and analog Modem as well as Data Transmission with X.75 over IP

Implementation of the integrated router HG 1500 means that analog fax and modem connections as well as data connections of the type X.75 can be transmitted between IP-networked communications platforms without the need for additional hardware. The system recognizes the connection type required on the basis of the configured station type (fax, modem or speech) and automatically establishes a connection in the IP network.

The following connection types are supported:

- Realtime fax transmission is supported in accordance with the ITU-T standard T.30 (fax group 3). Faxes are transmitted between the networked communications platforms at a maximum speed of 14.4 kbps (V.17).
- Data can be transmitted via modem over the IP network at a speed of 33.6 kbps using the ITU-T standard V.42.

- Data transmission to the ITU-T standard X.75

Support of Network-wide Features

The CorNet N protocol is supported for IP networking. which means that CorNet-N-specific features are transmitted over the IP network (tunnelling).

The following applies: Overall, the features that are transmitted today in the HiPath 3000/5000 Corporate Network, are also transmitted in the IP network although the old network has been enhanced in certain respects (see Section 4.6.3, “Network-Wide Features with IP Networking”).

Central Attendant Console

A central, system-wide attendant console can be configured within the IP network. The option to have a busy signal across the communications platform is new.

The busy signal across the communications platform is only available with optiClient Attendant.

Automatic Routing

Automatic routing to a backup or alternative network can be executed for new connections. A voice network (ISDN, for example) can also operate as a backup network. This ensures that the high availability of the HiPath 3000/5000 will not be affected when IP networks are being used by voice and fax connections. Automatic routing is initiated if

- the communications platform called is not available (due to faults or an overload in the IP network for example)
- No further capacity available for LAN access
  (maximum number of B channels for LAN gateway exceeded).
- explicitly requested for connections (fax or modem connections, for example).

ISDN lines are required as a trunk connection for routing data connections/VoIP connections over the integrated ISDN router.

Standard Numbering Plan

Telephone numbers are converted into the IP addresses of the remote communications platform (HiPath 3000) within the LAN access (HG 1500). A “routing table” which assigns the correct IP address to each destination call number or destination node number must be created to ensure that the IP address of the correct target node is implemented.

A network with either open or closed numbering should be configured for this purpose. When using closed numbering, each call number in the network can have up to six digits whereas in open numbering, the node number + call number together must not exceed six digits.

Standard Compliance

- Connection protocol

  “Voice over IP” to ITU H.323

- Voice transmission - Audio Codecs
  - ITU G.711
  - ITU G.723.1
  - ITU 6.729
- Echo suppression

  in accordance with ITU-T G.165

- Prioritization of data – Quality of Service (QoS)
  - IEEE 802.1d
  - RFC2474 Differentiated Services (DiffServ)
  - RFC791 Type of Service (TOS)

4.6.3 Network-Wide Features with IP Networking

New features have been added to the functionality of networking over digital leased lines via CorNet-N.

Function Name	Description of the Function
Network-Wide Features using CorNet-N/IP Networking	• Connection setup • Direct inward dialing in the network • Different rings (internal/external) • Transmission of number and name • Number or name shown on display • Callback on busy/free • Advice of charges output at subscriber line (AOC-D) • Call forwarding • Call forwarding (rerouting for optimization of B channel use.) • Message waiting indicator for callbacks and voicemail messages • Call waiting • Network-wide class-of-service (max. 4 classes of service)
Additional system services	• Network-wide shared numbering plan • Display of name and number suppressed • Consultation hold (over second B channel) • Transfer (over second B channel with release of tie trunk when station transferred) • Conference with max. five participants (no network-wide display function) • Toggle • Hunt group and group call across all nodes) • Directed joining and leaving a group, cross-nodal • Hunt group overflow • Call detail recording for all nodes (communication platforms) in the network (central solution)

Function Name	Description of the Function
Additional system services (continued)	• Transit traffic • Least cost routing (LCR) • Call pickup (call pickup with subscribers from other nodes (systems)) • Follow Me • Chain call forwarding (maximum number of stations monitored over several nodes) • Enable and disable features in IP-networked communications platforms with user prompts at optiPoint 500 and optiset E workpoints (night answer, for example). • Central attendant console (optiClient Attendant) with busy signal (the states free, internal/external busy and faulty are signalled for stations in IP-networked communications platforms.) • Central attendant console functions (forward, assign, recall, hold)
Use of only one B channel over CorNet N subset	The following features cannot be used over a dedicated line if a B channel has already been seized: • Consultation hold • Transfer • Toggle • Conference

Outside IP Networking, HiPath 3000/5000 provide an option for conventional networking over CorNet-N and QSig (ECMA V1.0 and ECMA V2.0).

4.6.4 Requirements of the IP Network

Requirements of the Bandwidth

In general, voice quality is heavily dependent on the quality of the IP network and its components such as switches and routers, for example. In networks that can provide QoS (see Page 4-74), customers have reported that the voice quality is extremely good despite compression using ITU G723.1.

However, to achieve this voice quality, the criteria described below must be fulfilled with regard to bandwidth and delay.

Required Connection Bandwidth

The customer network must fulfill the following requirements to ensure perfect transmission of voice over LAN:

- Switched LAN with 100 Mbps
- Separate port at the switch for each component involved in the IP network (no hubs used as concentrators)
- All components involved in voice transmission must support IEEE 802.1d at least (layer 2).
- In addition, all components involved must use routing to DiffServ standard RFC 2474 and the ToS standard (Type of Service) RFC 791.

Implementation in shared environments is possible but has not been released and is not recommended as quality cannot be guaranteed.

IP Trunking with HiPath 3000/5000 can also be operated in networks that have routing components.

Bandwidth

The bandwidth for voice must be available in the network at all times. Consequently, the network must be analyzed prior to installation of the components. The following data is required to calculate the required bandwidth for voice transmission in an IP network in relation to the number of simultaneous connections:

Type	Bandwidth per connection in the Ethernet	Bandwidth per connection in the WAN
Voice with ITU G.723.1	44 Kbps	19 Kbps
Voice with ITU G.711	180 Kbps	83 Kbps

All values refer to the lowest packaging level.

Type	Record size	Bandwidth requirement
Busy signal (optiClient Attendant)	300 bytes	3 Kbps
Call data record	200 bytes	1 Kbps
ACD information	3.5 K	10 Kbps

Bandwidth required by supplementary services
The specified bandwidth represents the load with respect to a maximum volume of calls with 1400 BHCA (this is the maximum traffic with a connected ACD application).

Accordingly, the minimum bandwidth required is as follows:

Required bandwidth	Formula [Kbps] (approximate values)
With ITU G.711	N x 180/83 (voice) + N x 4 (BLF+CDR) + 10 (ACD)
With ITU G.723.1	N x 44/19 (voice) + N x 4 (BLF+CDR) + 10 (ACD)
N = number of simultaneous voice connections	

When configuring fax or modem transmissions using the formula described above (outband transmission) the following are also required **for each configured connection**

- approximately 20 Kbps for fax group 3 (V.17, 14 Kbps)
- approximately 40 Kbps for modem connections (V.34, 33.6 Kbps).

Requirements of Delay Times

To achieve natural communication, the delay time in a voice connection (network delay) should not exceed 50 ms (one-way delay). Delays of more than 50 ms in one direction impair natural communication. The effect is similar to that experienced with voice connections over satellite. The maximum number of HOPs must not exceed 15.

The delay can be reduced particularly effectively by means of priority control.

Please proceed with caution if the network is operated using lines with a low bit rate (for example, connection of a branch to headquarters at a rate of 128 Kbps). If the trunk lines are overloaded, delays may occur thus causing the quality of the voice transmission to deteriorate. We therefore recommend that you provide higher bandwidths (reserves) or that you implement the G.723.1 Codec.

Maximum Package Losses

Package losses must not exceed 3 %. Deterioration in voice quality which is linked to package losses is more severe with G.723.1 than with G.711.

Minimization of Broadcast/Multicast Traffic

In accordance with the rules of good network design, broadcast/multicast traffic should be kept to a minimum. This can be achieved by structuring the network (VPN for example) using routers/layer 3 switches and by implementing layer 2 switches, which recognize multicasting.

Provision of QoS in Data Networks

The required Quality of Service (QoS) discussed in the previous sections can be guaranteed in a data network by means of the following:

- Network design,
  - in which bandwidth for voice information is reserved in an IP network (e.g. PVC in ATM, B channels in the ISDN network), or
  - by means of bandwidth reservation procedures (such as RSVP) in an IP network
  - by configuring VPNs
  - by overdimensioning the network capacity.
- By giving priority to voice over data:
  - Quality of Service (QoS) to IEEE 802.1d
  - Type of Service (ToS) to RFC 791
  - Differentiated Services (DiffServ - DS) to RFC 2474
- By means of the following extra options:
  - Switch/router gives priority to “voice ports” over “data ports”, or
  - Switch/router gives priority to all packages with an IP address for the communications platforms.

4.6.5 Special Features of Windows Networks

4.6.5.1 Routing and Name Resolution

For example: when routing from HG 1500 V3.0 to HG 1500 V3.0 and for peer-to-peer connections (Windows for Workgroup Network for IP routing), you must create an `LMHOSTS/HOSTS` file on the client PCs. This is stored in the Windows directory under Windows 95, and in the directory `WINNT\SYSTEM32\DRIVERS\ETC` under Windows NT or 2000. The file `LMHOSTS.SAM` in the directory can be expanded but must not have an extension (LMHOSTS).

Sample entry:

```
192.168.10.10 HG1500

192.168.10.20 PC1
```

Do not forget to press Return after the last entry.

Once the `LMHOSTS/HOSTS` file has been created, a ping command with the name (for example Ping HG 1500) should be transmitted to the partner. Since browsing is not transferred in the case of routers (broadcast messages), the other PC can only be found by right-clicking the "Network Neighborhood" and "Find Computer" icons. Once the computer has been found, the network resources can be accessed. The other PC cannot be accessed by opening the network neighborhood.

Names should contain no more than eight characters since some operating systems run into problems if there are more than eight characters in the name. Modifications in `LMHOSTS/HOSTS` are only effective after the computer has been rebooted. Under Windows 95 and 98 you can also use the command `NBTSTAT -R`.

4.7 IP Payload Switching

Introduction

IP payload switching optimizes communication between LAN-based IP workpoint clients.

In HiPath 3000 V1.2 and lower, two B-channels (with two DSP resources) in the HiPath HG 1500 **and** HiPath 3000/5000 -internal switching network were seized for internal network calls.

In HiPath 3000/5000 V3.0 and later, VoIP voice data (payload) is transferred directly between two IP workpoint clients in the network. When this happens, both IP workpoint clients have full access to all system features.

Payload switching is also implemented for IP networking (PBX routing).

By ceasing to use B-channels, we have managed to preserve HG 1500 resources and facilitate a higher volume of network-internal call traffic.

A B-channel is still required on the HG 1500 for connections to the following stations and lines:

- $U_{P0/E}$ stations (optiset E, optiPoint 500)
- Analog stations
- ISDN stations
- Trunks and tie lines (MSI, S_0, S_{2M})

Example: a consultation call to an optiPoint 500 telephone is set up during an existing connection between two IP workpoint clients. A HG 1500 B-channel is necessary for this consultation call.

In the case of conferences, the number of B channels seized corresponds to the number of stations and IP workpoint clients involved.

A HG 1500 DSP resource is permanently reserved for playing music-on-hold.

Example: (no network-wide display function) Six optiPoint 400 standards were logged on. The following scenario is possible in this case: two stations can conduct an external call, while two stations are listening to Music on Hold and two stations are talking to each other.

Prerequisites

The following components are necessary for using payload switching:

- IP workpoint clients
  - optiClient 130 V5.0
  - optiPoint 400/410/420 and optiPoint 600

  optiPoint 300 advance and the optiPoint IP adapter (supported up to and including V1.2) are not supported.
- HG 1500 boards with Digital Signal Processor DSP (voice and data)

4.8 Applications over IP

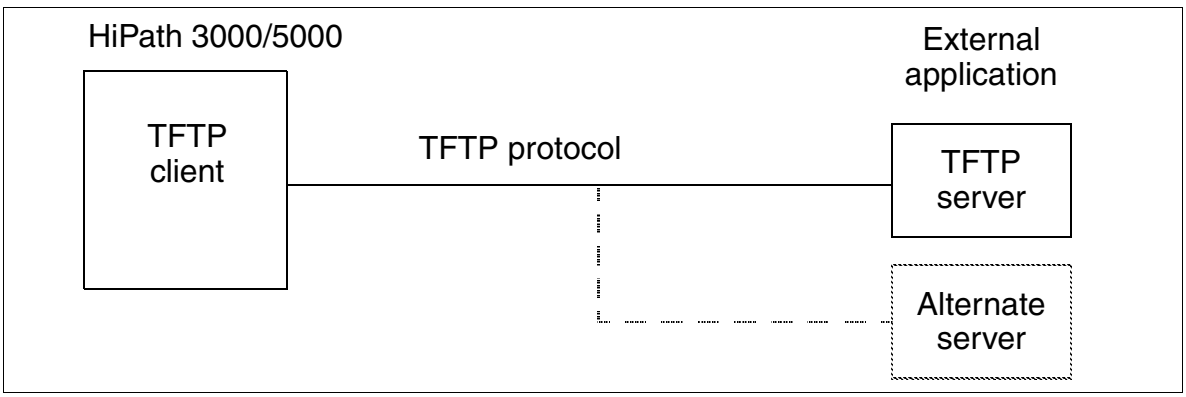
4.8.1 Call Detail Recording Central (CDRC) via IP

In HiPath 3000/5000 , you can start up the central call data output function only once, which means that it is available to only one application at a time. Three different modes exist to support the various requirements of the different applications.

Model-Specific Data

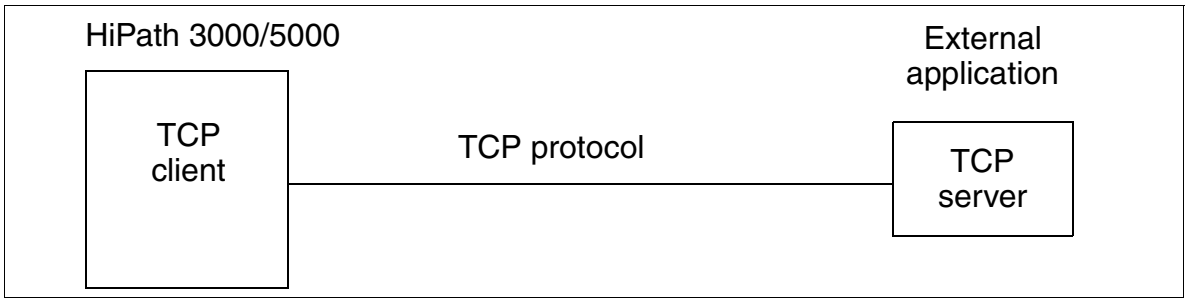
Subject	HiPath 3800	HiPath 3750 HiPath 3700	HiPath 3550 HiPath 3500	HiPath 3350 HiPath 3300
Feature available in	x	x	x	x
Hardware requirements	LIMS or HiPath HG 1500 board	LIM or HiPath HG 1500 board		
Software requirements	V1.0 or later	V1.2 or later	V1.2 or later	V1.2 or later

4.8.1.1 TFTP Client in HiPath 3000/5000



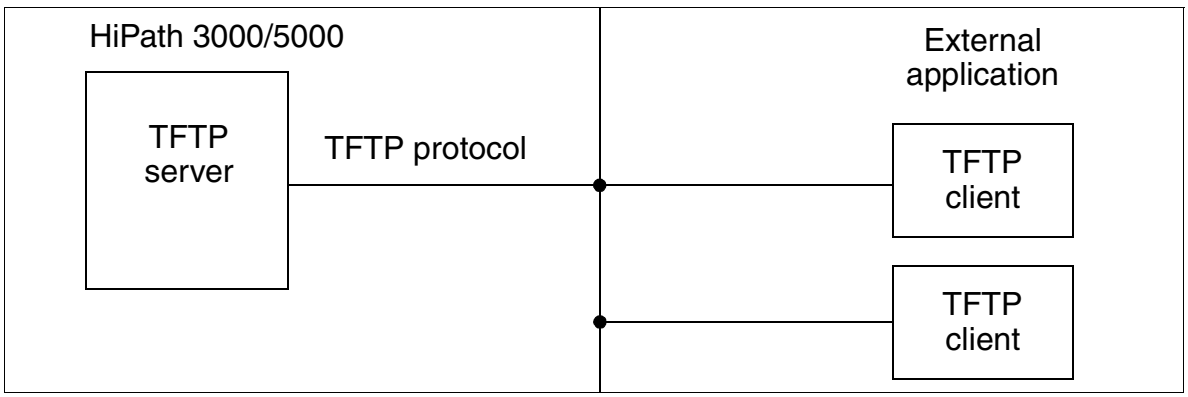
Controlled by a programmable timer and a fixed threshold value determining the call data buffer capacity (around 80 percent of the call data buffer full), the TFTP client (HiPath 3000/5000) sends call data to the TFTP server (external application). If the system cannot set up a connection to the TFTP server, it addresses an alternative server. If this server is also unavailable, it outputs an SNMP trap or error message (“Unable to output data”). The system tries to set up another connection every 60 seconds. A call data buffer overflow causes an error message to be entered in the error history file.

4.8.1.2 TCP Client in HiPath 3000/5000



When call data records accumulate, the TCP client (HiPath 3000/5000) sets up a TCP/IP connection to an external TCP server (external application) and transmits the data. The connection remains active continuously so that the system can send any further accumulated data, transmitting each data record separately.

4.8.1.3 TFTP Server in HiPath 3000/5000



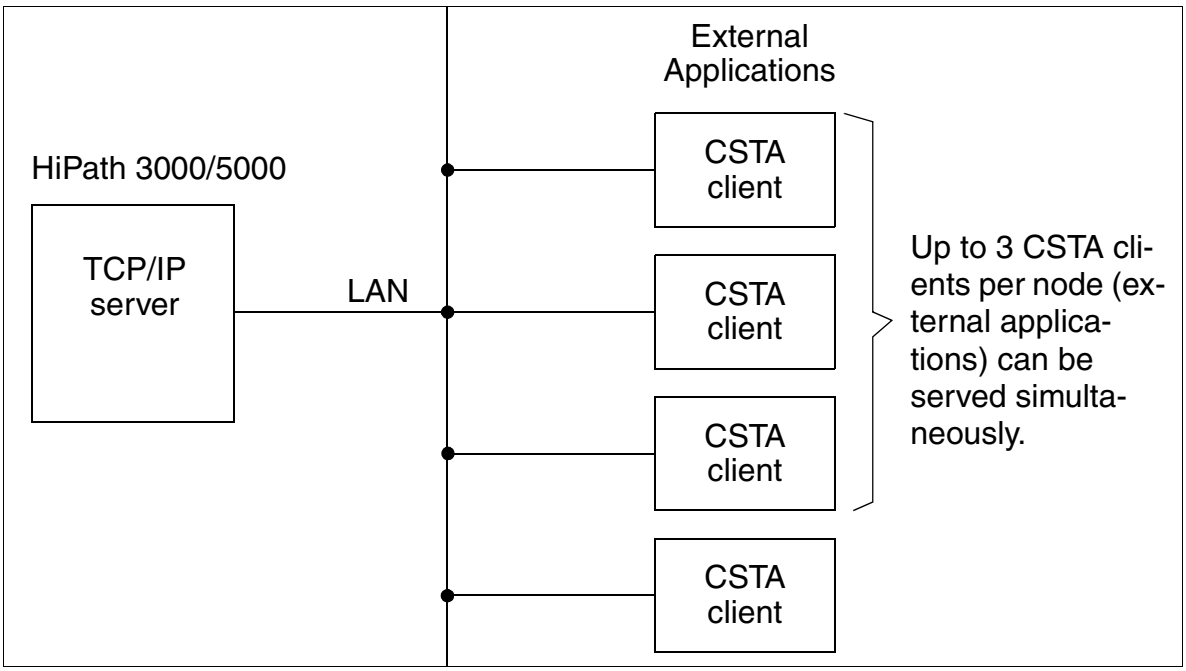
The external application (TFTP client) requests output of the call data records. To do this, the application must set up a connection and indicate the service (GET gez.txt), after which it receives all accumulated call data records. It releases the connection after the transfer.

The application's request for call data can be controlled automatically or using an SNMP trap (see Section 4.9.2). HiPath 3000/5000 sends the SNMP trap ("data available") to the external application, generating the trap using a programmable threshold value determining the call data buffer capacity (0 to 80 percent of the call data buffer full).

4.8.2 CSTA via IP

The Transmission Control Protocol TCP is used for CSTA via IP. A permanent link connection is set up. Data packet loss is detected and automatically corrected.

A total of three CSTA clients or applications can connect to HiPath 3000/5000 simultaneously via the LAN, and thus can use CSTA via IP simultaneously. Restrictions may apply to applications that use certain services. For example, only one application at a time can start the message registration function.



For an external application to address HiPath 3000/5000 , it must know the TCP port (7001) of the TCP/IP server implemented in HiPath 3000/5000 as well as the IP address. Data packets sent from an application to HiPath 3000/5000 -- that is, packets containing the HiPath IP address, TCP port 7001, and protocol type TCP -- are accepted for further processing.

Model-Specific Data

Subject	HiPath 3800	HiPath 3750 HiPath 3700	HiPath 3550 HiPath 3500	HiPath 3350 HiPath 3300
Feature available in	x	x	x	x
Hardware requirements	HG 1500 board			
Software requirements	V1.0 or later	V1.2 or later	V1.2 or later	V1.2 or later

4.9 Administration & Fault Management

4.9.1 Overview

HiPath 3000/5000 with a LIM or a HG 1500 board can be administered centrally over a LAN connection from one or more PCs using SNMP. The following functionalities can be implemented:

- Administration and fault management of a system (SNMP)
- APS update (TFP)
- CDB backup on TFTP server
- Network management

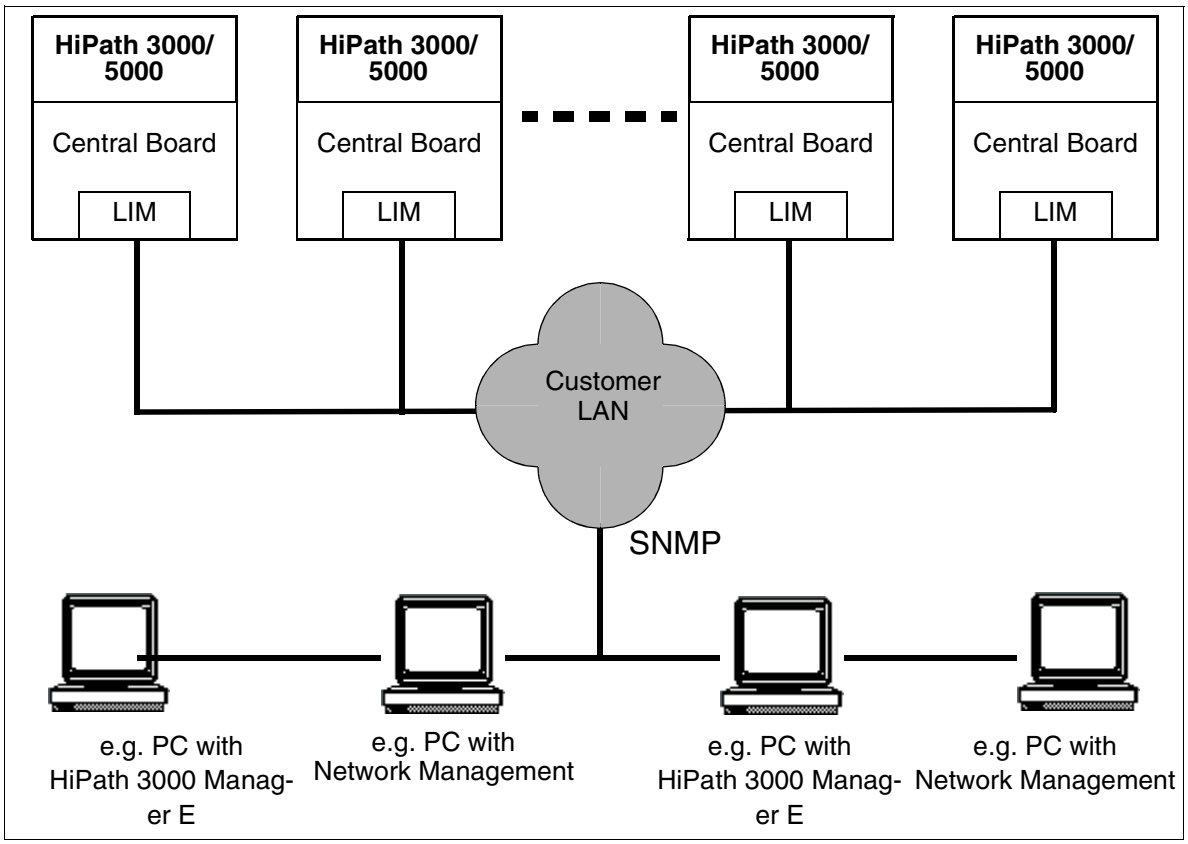


Figure 4-15 HiPath 3000/5000 - Administration over LAN

4.9.2 SNMP Functionality

4.9.2.1 Introduction

As part of the TCP/IP protocol family, the Simple Network Management Protocol (SNMP) is an easy-to-use platform for performing management tasks in the HiPath 3000/5000 system software. SNMP is used as a kind of management agent in HiPath 3000/5000 , making it possible to monitor and administer LAN components (including HiPath 3000/5000 itself) from a central location. This involves

- addressing HiPath 3000/5000 via the TCP/IP protocol family.
- external management applications, such as HP Open View and IBM Tivoli, to access data in HiPath 3000/5000 (using SNMP messages, such as GET, SET, TRAP).
- implementing remote maintenance tasks (online port status, enabling and disabling ports, determining free ports) (HiPath Fault Management)
- transmitting service-related class B errors
- visualizing the operating status of HiPath 3000/5000 systems.

4.9.2.2 Overview of SNMP Functions

Management Information Bases (MIBs)

MIBs define the volume of data that can be administered via SNMP. They are data models that describe the network elements to be administered in a very specific form.

HiPath 3000/5000 supports

- standard MIB II (according to the RFC1213 Internet standard), which provides Internet and router functions;
- parts of the RMON 1/2 standard MIBs (RFC 1757, RFC 2021), which support
  - Error history
  - Trap configuration
  - TFTP configuration
  - General system information

- a user-specific MIB that processes HiPath-specific statistic data (feature counters) and internal error messages (error history), covering the following areas:
  - ControlGroup – status variables, general configuration, supplementary TFTP configuration data
  - SystemInfoGroup – system configuration and status
  - StatisticsGroup – statistic data on features
  - ErrorHistoryGroup – Error history in HiPath format
    Error messages are forwarded in the form of SNMP traps via the LAN to a specific external management application. The SNMP traps form the error history data structure (time stamp, error class, error description).

These components use the IP protocol according to OSI layer 3 and the UDP protocol according to layer 4. The SNMP protocol stack uses port numbers. The system supports the SNMP protocol version 1.0.

SNMP Messages

The following commands control SNMP messages for communication between the SNMP management agent (HiPath 3000/5000) and external applications:

- GET – retrieve data from agent
- GET NEXT – read out data sequentially
- SET – write data
- TRAP – alarm messages issued by the SNMP agent

There is an integrated mechanism for generating SNMP traps in the event of class B errors. The SNMP management agent evaluates the error messages. In the case of defined errors, it generates specific traps and transmits them in the form of IP data records to a configurable IP address (a total of five SNMP V1.0-compatible applications are supported, including HP Open View Network Node Manager for example).

4.9.2.3 Using SNMP

An MIB browser (available with Hewlett-Packard's "Network Node Managers") is required for using SNMP functionality.

SMNP traps

Trap
COLD START
WARM START
INTERFACE UP
INTERFACE DOWN
AUTHENTICATION ERROR (incorrect SNMP community name)

Table 4-16 Generic SNMP Traps (MIB-2)

The following HG 1500-specific trap classes are available:

- General traps
- Reboot traps
- Threshold/statistic, resource/diagnostic traps,
- Security traps
- License traps
- Traps for internal errors

The following tables list the individual traps for each of these classes. A distinction is made under "Type" between hardware traps (HW) and software traps (SW).

Type (SW/HW)	Trap Message	Explanation
SW	MSG_GW_SUCCESSFULLY_STARTED	Gateway successfully started

Table 4-17 General Traps (HG 1500-Specific)

Type (SW/HW)	Trap Message	Explanation
SW	MSG_CAT_H323_REBOOT	Reboot with H.323
SW	MSG_CAT_HSA_REBOOT	Reboot with HSA

Table 4-18 Reboot Traps (HG 1500-Specific)

Type (SW/HW)	Trap Message	Explanation
SW	MSG_ADMIN_REBOOT	Reboot with WBM/CLI-Admin, software upgrade or data restore
SW	MSG_SYSTEM_REBOOT	Automatic reboot, for example with Garbage Collection
SW	MSG_EXCEPTION_REBOOT	Reboot with SW exception
SW	ASSERTION_FAILED_EVENT	Reboot following declared exception
SW	EXIT_REBOOT_EVENT	Reboot following exception on termination
HW	MSG_DSP_REBOOT	Reboot following DSP error
HW	MSG_DELIC_ERROR	Reboot following DELIC error

Table 4-18 Reboot Traps (HG 1500-Specific)

Type (SW/HW)	Trap Message	Explanation
HW	MSG_IP_LINK_FAILURE	IP-Link 1 up/down
HW	MSG_IP_LINK2_FAILURE	IP Link 2 up/down
HW	MSG_OAM_HIGH_TEMPERATURE_EXCEPTION	Temperature limit reached (too hot)
SW	MSG_GW_OBJ_MEMORY_EXHAUSTED	Out of memory
SW	MSG_GW_OBJ_ALLOC_FAILED	Out of memory (signaled by external source)
SW	MSG_GW_OBJ_MEMORY_INCONSISTENT	Memory inconsistency
SW	MSG_TLS_POOL_SIZE_EXCEEDED	No more internal pools
SW	MSG_OAM_RAM_THRESHOLD_REACHED	RAM limit reached
SW	MSG_OAM_DMA_RAM_THRESHOLD_REACHED	DRAM limit reached
SW	MSG_OAM_THRESHOLD_REACHED	Limit reached, for example, for flash memory or IP pools
SW	MSG_DVMGR_LAYER2_SERVICE_TRAP	B channel up/down

Table 4-19 Threshold/Statistic, Resource/Diagnostic Traps (HG 1500-Specific)

Type (SW/HW)	Trap Message	Explanation
SW	MSG_HACKER_ON_SNMP_PORT_TRAP	Unauthorized access to SNMP port

Table 4-20 Security Traps (HG 1500-Specific)

Type (SW/HW)	Trap Message	Explanation
SW	MSG_LIC_DATA_ACCEPTED	License data accepted
SW	MSG_LIC_DATA_CORRUPTED	License data incomplete
SW	MSG_LIC_DATA_NOT_ACCEPTED	License data not accepted

Table 4-21 License Traps (HG 1500-Specific)

Type (SW/HW)	Trap Message
SW	MSG_WEBSERVER_MAJOR_ERROR
SW	MSG_SSM_NUM_OF_CALL_LEGS_2BIG
SW	MSG_SSM_SESSION_CREATION_FAILED
SW	MSG_IPNCV_STARTUP_ERROR
SW	MSG_IPNCV_STARTUP_SHUTDOWN
SW	MSG_IPNCV_INTERNAL_ERROR
SW	MSG_IPNCV_MEMORY_ERROR
SW	MSG_IPNCV_SIGNALING_ERROR

Table 4-22 Traps for Internal Errors (HG 1500-Specific)

The weighting of the individual traps can vary depending on the severity of the event or error and is described by the following categories:

- Cleared (problem already resolved)
- Indeterminate (no classification possible)
- Critical (critical error)
- Major (major error)
- Minor (minor error)
- Warning (warning only)

- Information (for information only)

General traps, such as MSG_GW_SUCCESSFULLY_STARTED, are sent as "information".

Reboot traps are always "critical", "major" or "minor" errors.

Threshold/resource traps occur as follows: When an event is received, the trap is sent as either "Warning", "Minor" or "Major". If the trap recurs, reminders are sent (at increasing intervals) with a weighting that is at least the same or higher than the initial trap. If the event was corrected (for example, "Link up" or sufficient RAM was provided), the trap is sent with the category "Cleared".

SNMP Functions

The SNMP functions include:

- With MIB browser and standard MIB (based on RFC1213):
  - querying and modifying standard MIB 2 parameters
- With MIB browser and private MIB:
  - querying and modifying HG 1500 V3.0's private MIB parameters
- With HiPath 3000 Manager E:
  - defining communities of standard parameters (classes of service)
  - defining trap communities and stations to which the traps are sent
  - defining the trap level for various trap groups (error sensitivity)
- With trap receiver:
  - receiving traps

MIBs also contain a brief commentary explaining the meaning of each parameter.

The following is a list of some parameters:

- mgmt > mib-2 > system > sysUpTime: time since the last HG 1500 V3.0 startup
- HLB2MIB > siemensUnits > pn > hlb2mib > controlGrouphlb20 > sysSoftwareVersion: board software release
- mgmt->mib-2->ip->ipRouteTable: HG 1500 V3.0 routing table

HG 1500 V3.0 sends SNMP traps (diagnostic and error messages) to the stations configured under "SNMP > Trap Communities". These messages are transmitted in accordance with the severity levels set under "SNMP".

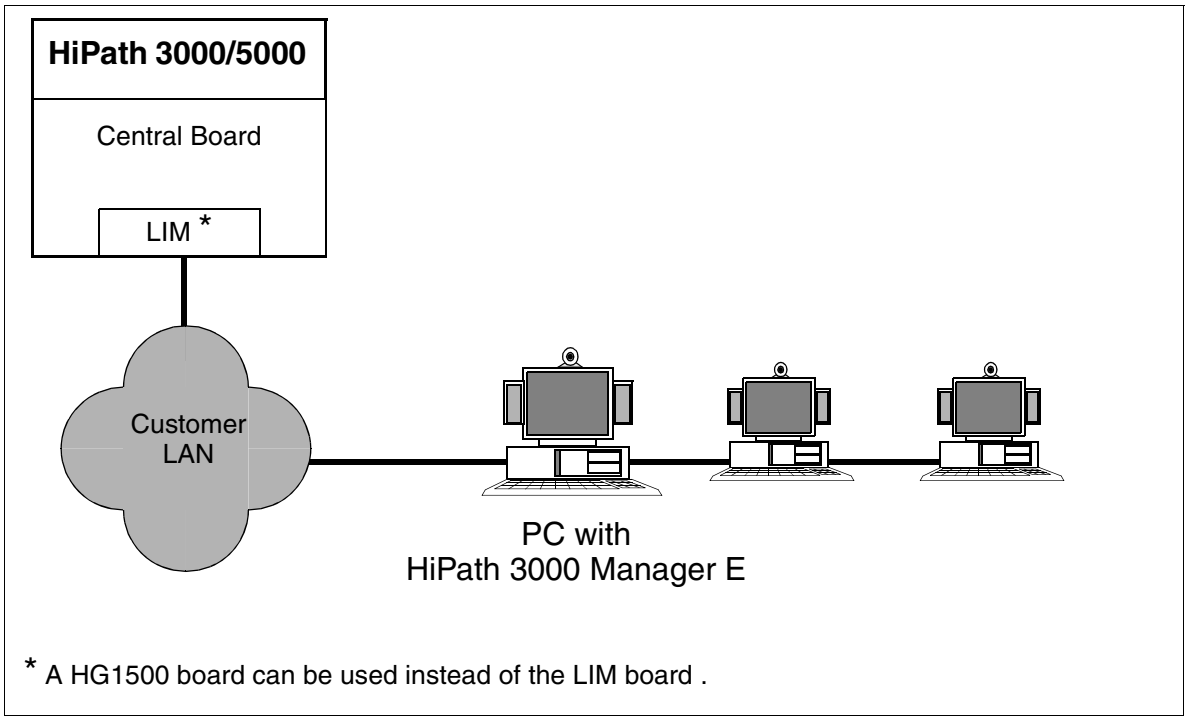
Examples of traps generated by HG 1500 V3.0:

1. Generic traps (cannot be deactivated):
   - warm start
   - cold start
   - authentication failure
2. Enterprise traps (can be configured)
   - data init (WARNING - forced data reinitialization)
   - memory low (WARNING - memory resources below the threshold)
   - duplicate mac (MINOR - duplicated MAC address)
   - ip firewall (WARNING - IP firewall violation)
   - mac firewall (WARNING - MAC firewall violation)
   - isdn access (WARNING - ISDN access verification)

SNMP information can also be sent as e-mail to a mail address configured with the WBM.

4.9.3 Administering HiPath 3000/5000 via the LAN Interface

You can administer HiPath 3000/5000 via a computer connected to the LAN.



* A HG1500 board can be used instead of the LIM board .

Model-Specific Data

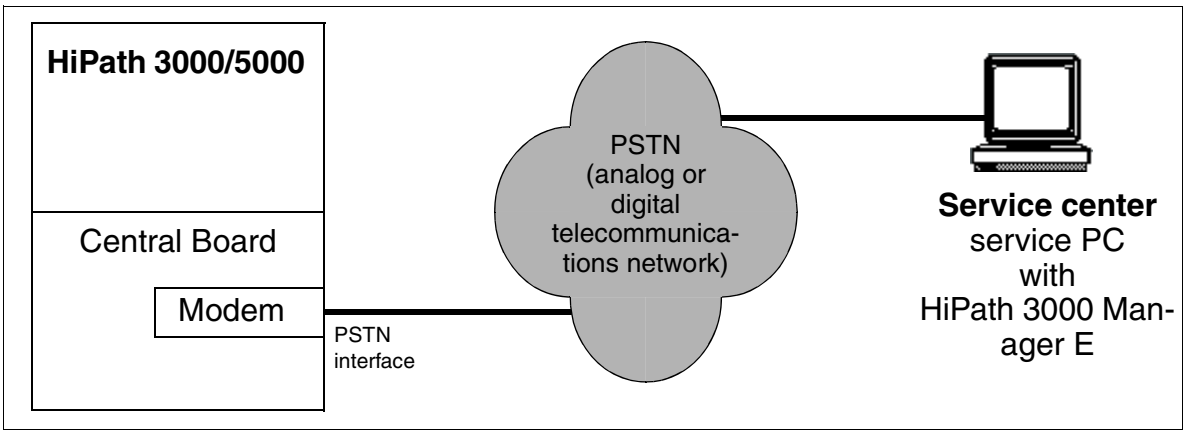
Subject	HiPath 3800	HiPath 3750 HiPath 3700	HiPath 3550 HiPath 3500	HiPath 3350 HiPath 3300
Feature available in	x	x	x	x
Hardware require-ments	LIMS or HG 1500 board	LIM or HG 1500 board		
Software requirements	V1.0	V4.0		

4.9.4 Remote Administration of HiPath 3000/5000 via PPP

You can administer multiple HiPath 3000/5000 systems from a central service center via PPP (point-to-point protocol). Each HiPath 3000/5000 is addressed via its PSTN (public switching telephone network) interface.

You must enter a router call number (DID number) for every PSTN interface in the service center for external access to HiPath 3000/5000 . This call number is not the number previously used for administration via integrated digital modem
(B channel) or integrated analog modem (IMODN).

You can establish a connection between the service center and HiPath 3000/5000 using either the integrated digital modem (B channel) or the integrated analog modem (IMODN). Data is exchanged in both cases using Point-to-Point-Protocols (PPP).



If the connection is established via callback, HiPath 3000/5000 first of all denies a connection request from the service center (HiPath 3000 Manager E). A callback is then set up to the service center's calling party number transferred via the PSTN connection's D channel.

Model-Specific Data

Subject	HiPath 3800	HiPath 3750 HiPath 3700	HiPath 3550 HiPath 3500	HiPath 3350 HiPath 3300
Feature available in	x	x	x	x
Hardware require-ments	CBSAP	CBCPR	CBCC/ CBRC	CBCC/ CBRC
Software requirements	V1.0	V4.0		

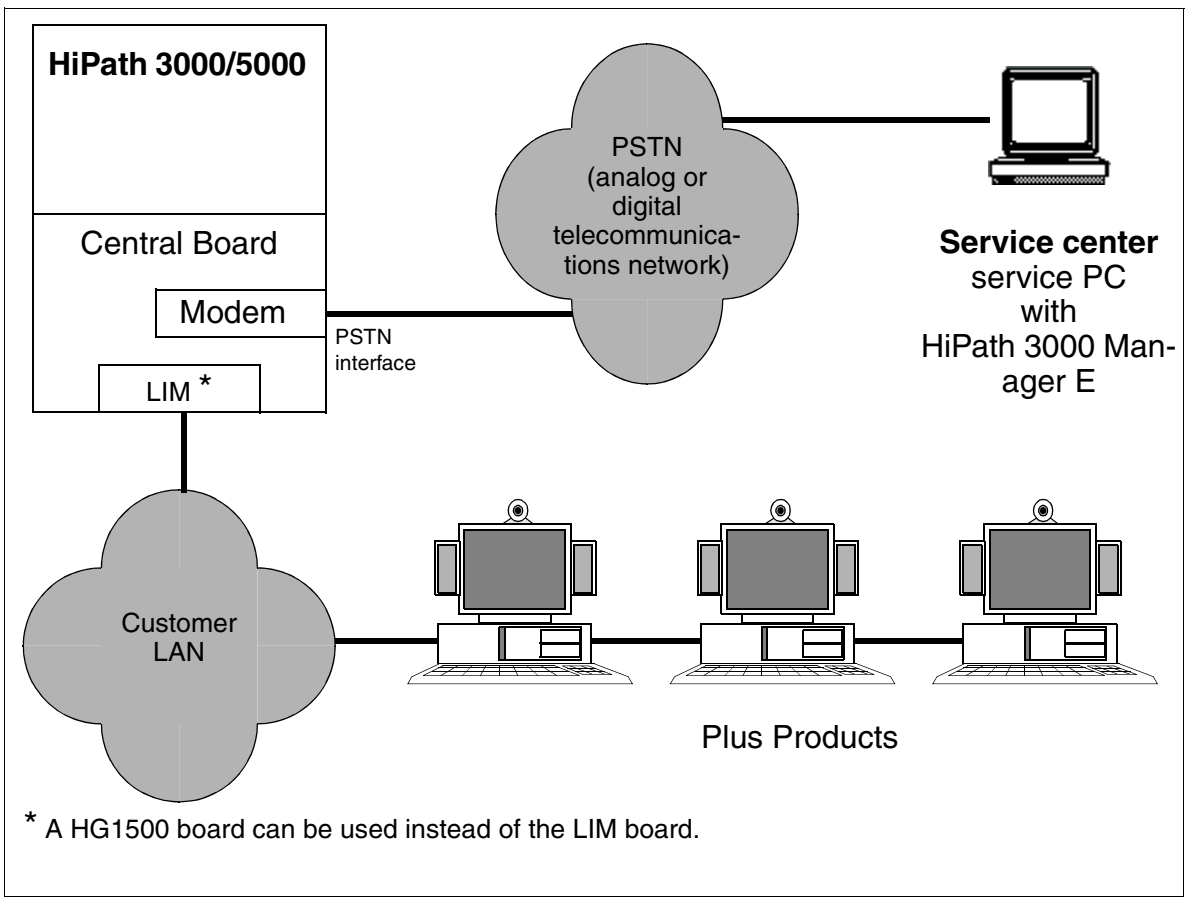
4.9.5 Remote Administration of Plus Products via PPP

You can use HiPath 3000/5000 to administer Plus Products from a central service center. HiPath 3000/5000 merely provides the transmission medium for this. The actual Plus Product administration is performed via special software programs, such as pcANYWHERE.

HiPath 3000/5000 is addressed from the service center via its PSTN (public switching telephone network) interface. The Plus Products connected to a LAN can be reached via the HiPath 3000/5000 's LAN interface (LIM). In this case, HiPath 3000/5000 acts like a router.

You must enter a router call number (DID number) for every PSTN interface in the service center for external access to HiPath 3000/5000 .

The Plus Product and service center connection can be established via the integrated digital modem
(B channel) or the integrated analog modem (IMODN). Data is exchanged in both cases using Point-to-Point-Protocols (PPP).



Access Mechanism

A list of up to twenty remote structures controls access from the service center to the customer LAN and vice versa. Each remote structure contains the following information:

- The IP address of the service center (= PSTN partner in the service center) for setting up connections from the customer LAN to the service center and for the automatic transmission of error messages (SNMP traps).
- The DID number (part of the numbering plans) for direct identification of this remote structure.
- Up to five PSTN remote numbers marked as incoming (for identifying the remote structure - when dialing the router call number) and/or outgoing (for use as callback address).
- Short hold mode Yes/No
  - If "Short hold = Yes" is selected, an inactive PSTN connection is cleared down after a set time (short hold timeout). If there are new data packets to be transmitted, the connection is set up once again (transparent for the user). This mechanism is also known as a background connection setup or cleardown. Costs are only incurred when the line is actually used.
  - If “Short hold = No” is selected, a PSTN connection remains permanently active until the end criterion is received.
- Short hold (sec.)
  This parameter describes the length of time in seconds after which an inactive PSTN connection is cleared down.
- Callbk Yes/No
  - If “Callbk = Yes” is selected, a connection request is first of all denied. Then the first station number marked as outgoing in the remote structure found is called back. Three attempts are made to set up the connection, then the next outgoing station number is used. The system stops trying to set up the callback after three unsuccessful attempts.
  - If “Callbk = No” is selected, the connection is set up immediately.
- Remote analog modem
  If you select “Yes”, the V.34 protocol in the B channel is used for an outgoing connection via the ISDN line.
- IP mapping Yes/No
  If a number of different customers have the same IP address, you can use address mapping to achieve unique IP address assignment in the various customer LANs.
  - If “IP mapping = Yes” is selected, you can map an IP address which is assigned to multiple customers to a unique “virtual” IP address. You can perform IP mapping for up to twenty address entries.

Examples:
IP data transfer from the customer LAN to the service center via the PSTN interface:
IP customer LAN is transformed by HiPath 3000/5000 into an IP virtual LAN.
IP data transfer from the service center to the customer LAN via the PSTN interface:
IP virtual LAN is transformed by HiPath 3000/5000 into an IP customer LAN.

– If “IP mapping = No” is selected, IP address mapping is not available.

- Security mechanisms for connection setup
  Use the PAP (PPP authentication protocol) and/or CHAP (challenge-handshake authentication protocol) to determine whether
  – the Plus Product (client) must be authenticated at HiPath 3000/5000 (host) or
  – the HiPath 3000/5000 (host) must be authenticated at the Plus Product (client).

  Authentication is based on the user ID and the password.

Model-Specific Data

Subject	HiPath 3800	HiPath 3750 HiPath 3700	HiPath 3550 HiPath 3500	HiPath 3350 HiPath 3300
Feature available in	x	x	x	x
Hardware requirements	LIMS or HiPath HG 1500 board	LIM or HiPath HG 1500 board		
Software requirements	V1.0 or later	V1.2 or later	V1.2 or later	V1.2 or later

- **Support for the External Gatekeeper**

  The gatekeeper registers the H.323 clients and administers their rights and services. It converts the clients' call numbers into logical names or IP addresses and vice versa. It also registers the gateways and can be networked with adjacent gatekeepers.

- **Quality of Service (QoS)**

  To guarantee the bandwidth required for Voice over IP, IP packets can be marked and are thereby transported with priority in the LAN/WAN.

- **Networking of more than one System via IP**

  SeveralHiPath 3000/5000 telephone systems can be connected to each other with Voice over IP (H.323) for telephony.

- **Authentication**

  If you set up an external connection via HG 1500, you can use the PAP (Password Authentication Protocol) and CHAP (Challenge Handshake Authentication Protocol) procedures to authenticate the other party to increase security in data networks.

- **Second LAN connection (optional)**

  A second LAN connection is set up to decouple the DSL WAN connection. A routing function is used to connect the first LAN.

- **DSL support (optional)**

  The configuration database is extended to include an additional interface. The information necessary for dialing into the DSL network is provided here. The enhanced configuration parameters can be entered over the HiPath 3000 Manager I. The DSL functionality is only available for the second LAN connection.

4.10 Networking Scenarios

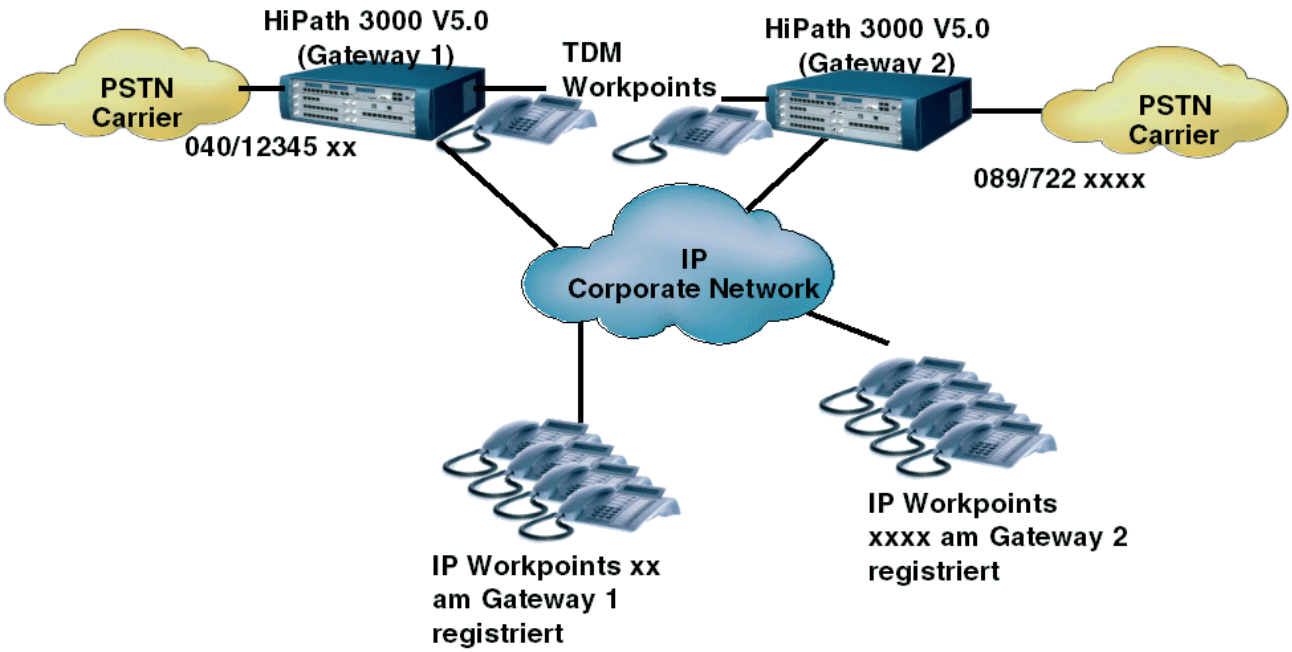
The following table shows permissible trunking scenarios when networking HiPath 3000/5000 V5.0 or HiPath 4000 via CorNet IP or CorNet NQ via TDM lines.

Example	Trunking scenario	Closed or open numbering	Numbering plan	Remark
Example 1	Pure HiPath 3000 IP trunking	Closed	Private numbering plan	Dialing by means of an internal number
Example 2	Pure HiPath 3000 IP trunking	Open	Private numbering plan	Dialing by means of a node number + internal number
Example 3	One HiPath 3000 as a gateway and one HiPath 5000 CS	Closed	Private numbering plan	Dialing by means of an internal number
Example 4	One HiPath 3000 as a gateway and one HiPath 5000 CS		Private numbering plan	HiPath 5000 CS is only available from a PSTN if a node number + an internal number are available in the customer's station number block
Example 5	Several HiPath 3000 systems as gateways and one HiPath 5000 CS	Closed	Private numbering plan	Dialing by means of an internal number
Example 6	Several HiPath 3000 systems as gateways and one HiPath 5000 CS	Closed between a gateway and HiPath 5000 CS, open to the remaining gateways	Private numbering plan	Dialing by means of a node number + internal number or dialing via an ISDN number
Example 7	HiPath 3000/4000/ 5000	Closed	ISDN numbering plan	However, no HiPath 5000 RSM, no presence service, no network-wide HPCO, no network-wide CSTA functionality, network-wide Xpressions Compact possible
Example 8	HiPath 3000/4000/ 5000		ISDN numbering plan	However, no HiPath 5000 RSM, no presence service, no network-wide HPCO, no network-wide CSTA functionality, no network-wide Xpressions Compact

Table 4-23 Networking Scenarios

4.10.1 Example 1

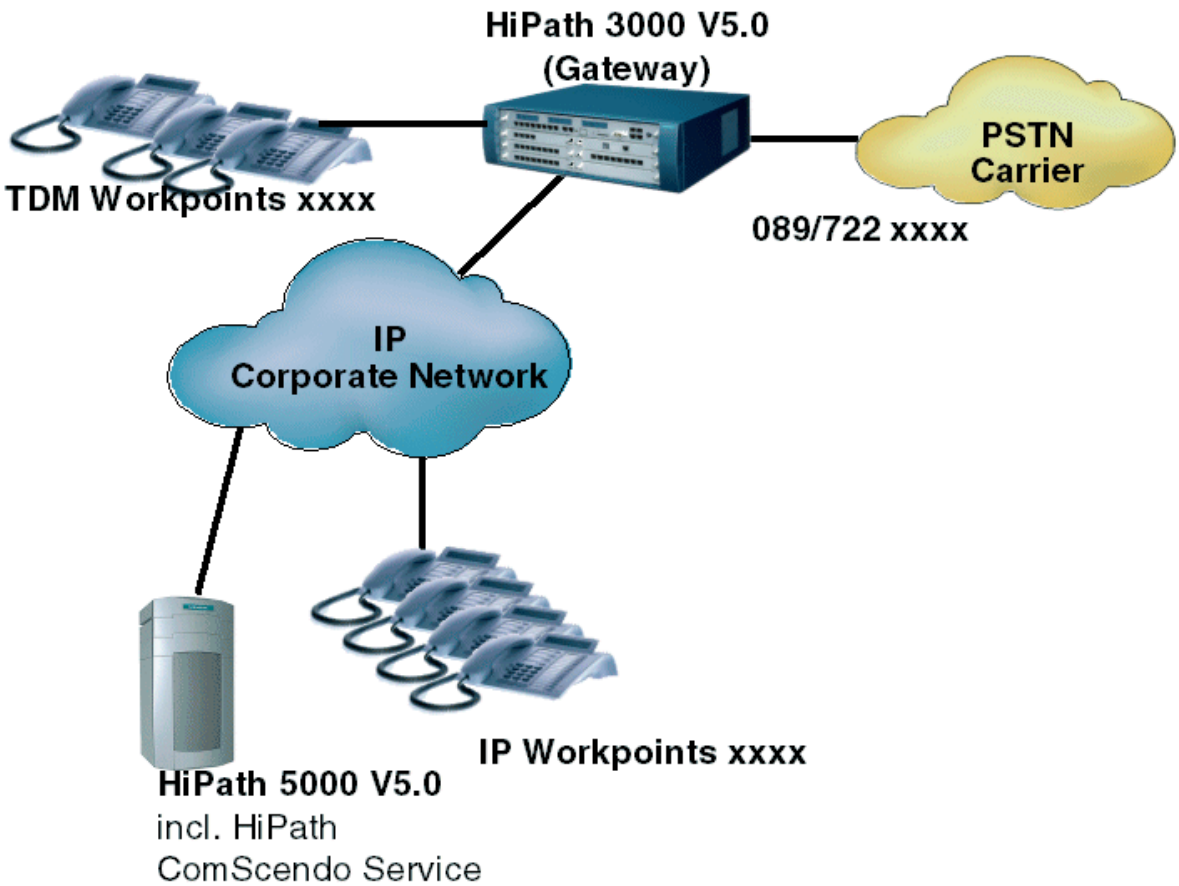
IP Trunking HiPath 3000/3000, 2 Nodes in the Network



- Functional scope between HiPath 3000/3000 corresponds to CorNet IP
- Closed numbering (private numbering plan):
  Dialing from node to node: internal number
  Dialing from PSTN: subscriber line + internal number
- Open numbering:
  Dialing from node to node: dialing of the node code + internal number (private numbering plan)
- Implementation of the 5000 RSM Feature Server for closed and open numbering
- Max. 1000 workpoints in the network when using the 5000 RSM Feature Server (incl. TDM)
- Max. 32 nodes in the network when using the HiPath 5000 RSM Feature Server
- Max. 64 nodes in the network without the 5000 RSM Feature Server
- An optional HPCO V1.3 can be implemented (for max. 16 nodes in the network)
  - As an alternative, ProCenter Agile can be used at one node
- An optional Xpressions Compact can be implemented centrally
  - As an alternative, Xpressions V3.0 can be implemented centrally

4.10.2 Example 2

IP Trunking HiPath 3000/5000, 2 Nodes in the Network with Closed Numbering

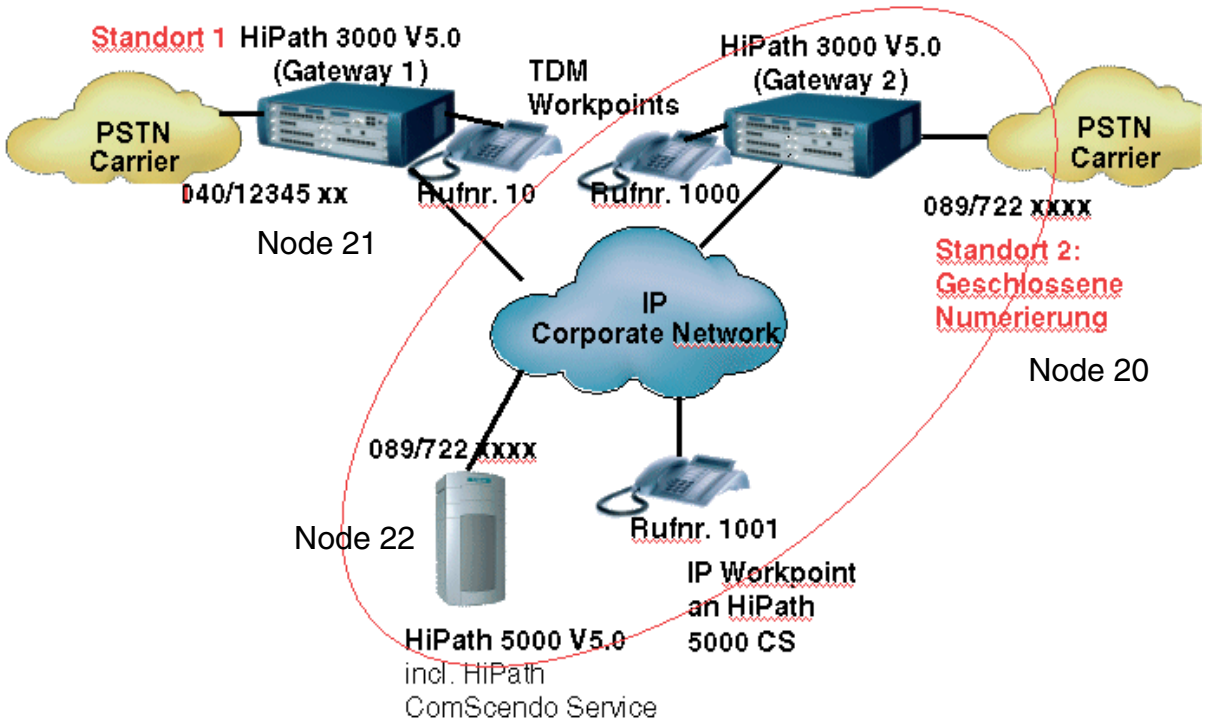


- Functional scope between HiPath 3000/5000 CS corresponds to CorNet IP
- Closed numbering:
  Dialing from node to node: internal number
  Dialing from PSTN: subscriber line + internal number
- Open numbering is not supported by this configuration.
  (Availability of the PSTN not guaranteed as the node number is not included in the customer's station number block, CCBS not guaranteed, etc.)
  Exception: where the node number + internal number are contained in the customer's station number block.
- Max. 1000 workpoints in the network when using the 5000 RSM Feature Server (incl. TDM)
- Max. 32 nodes in the network when using the HiPath 5000 RSM Feature Server

- Max. 64 nodes in the network without the 5000 RSM Feature Server
- An optional HPCO V1.3 can be implemented (for max. 16 nodes in the network)
  - As an alternative, ProCenter Agile can be used at one node
- An optional Xpressions Compact can be implemented centrally
  - As an alternative, Xpressions V3.0 can be implemented centrally

4.10.3 Example 3

IP Trunking HiPath 3000/3000/5000, Gateway 2 and HiPath 5000 CS at Location 2 with Closed Numbering, Gateway 1 at Location 1 Establishes Open Numbering to Location 2

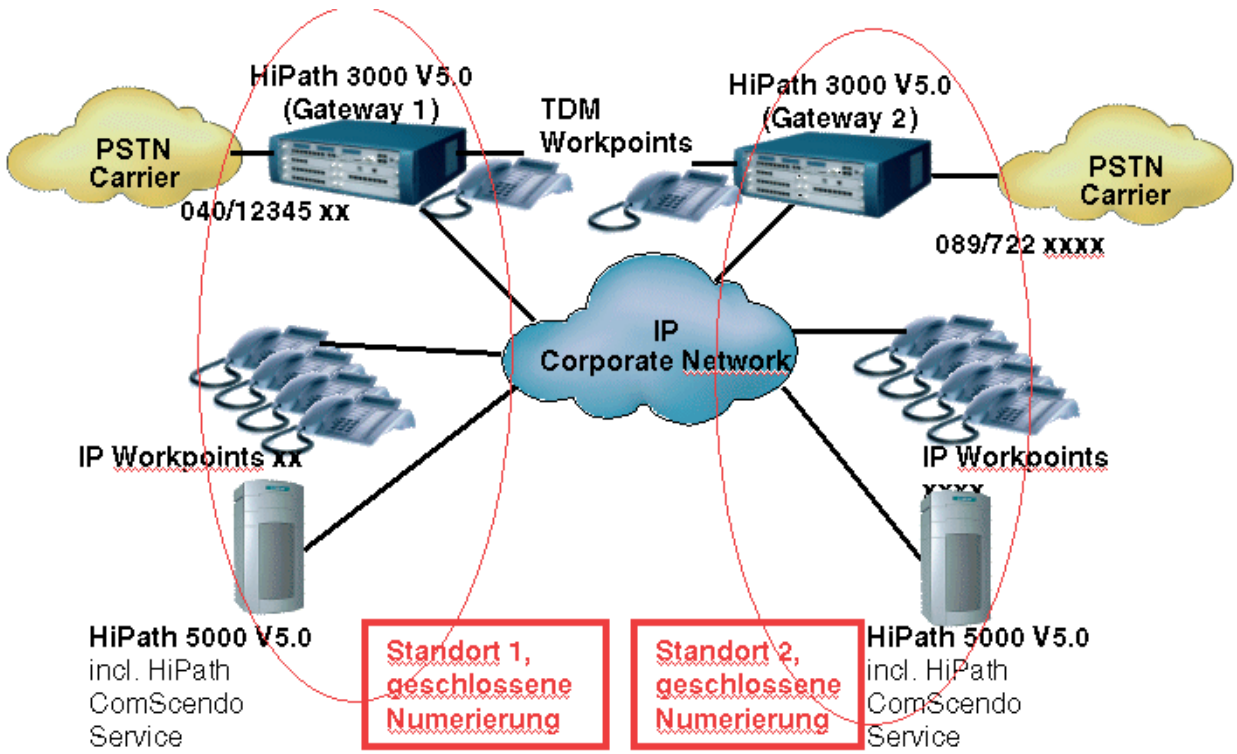


- Functional scope between HiPath 3000/5000 CS corresponds to CorNet IP
- In this example, the private numbering plan should be used. Node numbers that are unique throughout the network should be configured for each location.
- The workpoints of gateway 2 and HiPath 5000 CS establish a closed numbering plan at location 2.
  Dialing from gateway 2 to 5000 CS: node number + internal number.
  Dialing gateway 2 or 5000 CS from the PSTN: subscriber line (location 2) + internal number.

- Workpoints at gateway 1 reach workpoints at gateway 2 or the HiPath 5000 CS via node number + internal number
- Workpoints at gateway 2 or the HiPath 5000 CS reach workpoints at gateway 1 via node number + internal number
- Max. 1000 workpoints in the network when using the 5000 RSM Feature Server
- Max. 32 nodes in the network when using the HiPath 5000 RSM Feature Server
- Max. 64 nodes in the network without the 5000 RSM Feature Server
- An optional HPCO V1.3 can be implemented (for max. 16 nodes in the network)
  - As an alternative, ProCenter Agile can be used at one node
- An optional Xpressions Compact can be implemented centrally
  - As an alternative, Xpressions V3.0 can be implemented centrally

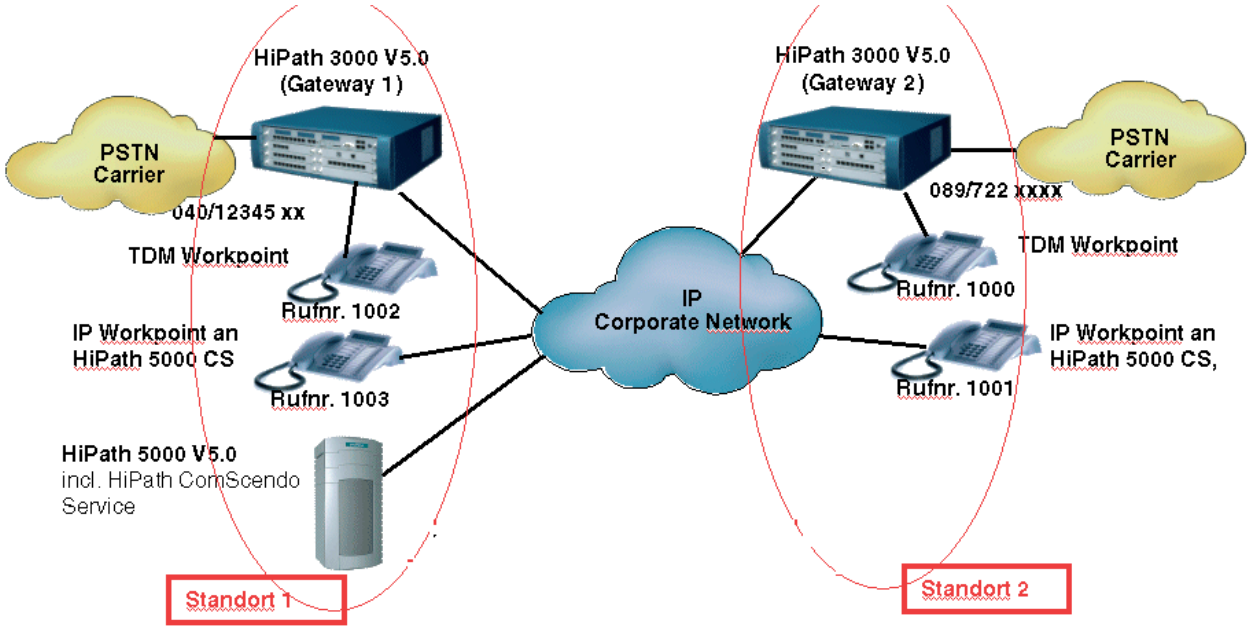
4.10.4 Example 4

IP Trunking HiPath 3000/5000, 4 Nodes at 2 Locations
(Essentially the Same as Example 3)



4.10.5 Example 5

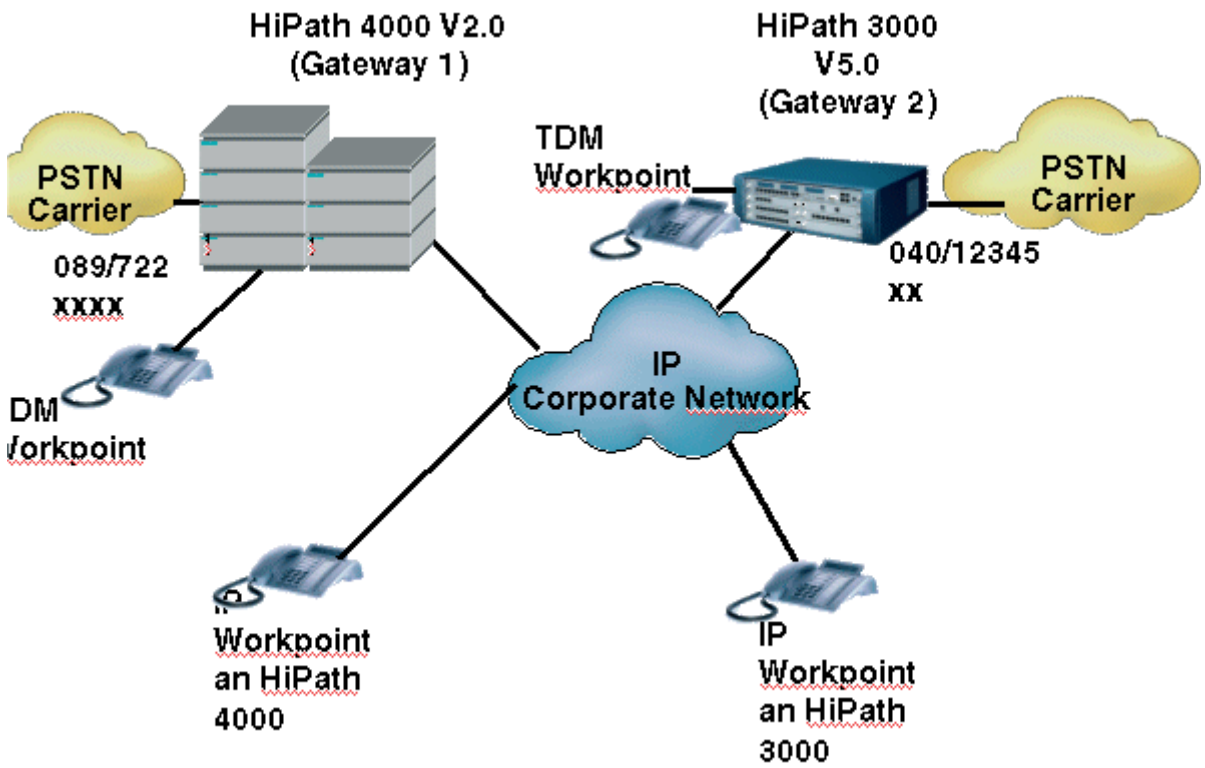
Distributed IP Workpoints



- Boundary condition: the IP workpoints are only registered at the HiPath 5000 CS, distributed physically across two locations.
- IP trunking connections (node to node) offer the functional scope of CorNet IP
- Connections from IP workpoint to IP workpoint are internal HiPath 5000 CS connections and so offer a greater functional scope than CorNet IP
- Unlike IP trunking connections, where, as a result of the configuration of the trunking channels, the maximum required bandwidth can be restricted, the bandwidth limit in the case of workpoint connections is established based on the number of possible parallel IP workpoint connections from location 1 to 2.

4.10.6 Example 6

IP Trunking HiPath 3000/4000



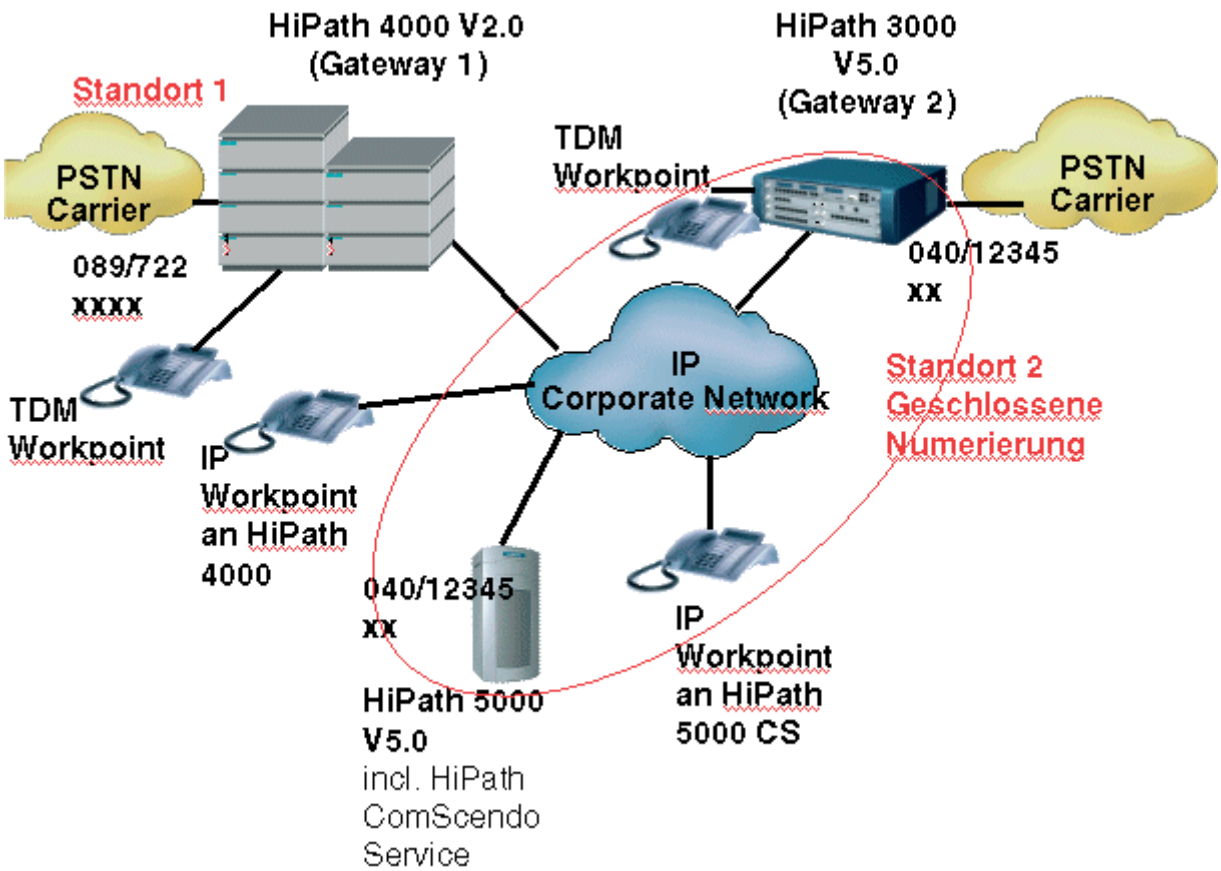
- Functional scope between HiPath 4000/3000 corresponds to CorNet IP
- Closed numbering (private numbering plan):
  Dialing from node to node: internal number
  Dialing from PSTN: subscriber line + internal number
- Open numbering:
  Dialing from node to node:
  - Variant 1: Dialing of the node code + internal number (private numbering plan)

    or
  - Variant 2: Dialing of the CO number (ISDN numbering plan)
- Implementation of the 5000 RSM Feature Server for closed numbering only
- Max. 1000 workpoints in the network when using the 5000 RSM Feature Server (incl. TDM)
- Max. 32 nodes in the network when using the HiPath 5000 RSM Feature Server

- Max. n times 64 nodes in the network without the 5000 RSM Feature Server
- An optional HPCO V1.3 can be implemented (for max. 16 nodes in the network) for closed numbering and open numbering as per variant 1 only
  - As an alternative, ProCenter Agile can be used at one node
- Central Xpressions Compact
  for closed numbering and open numbering as per variant 1 only

4.10.7 Example 7

IP Trunking HiPath 3000/4000/5000,
Location 1 Establishes Open Numbering to Location 2



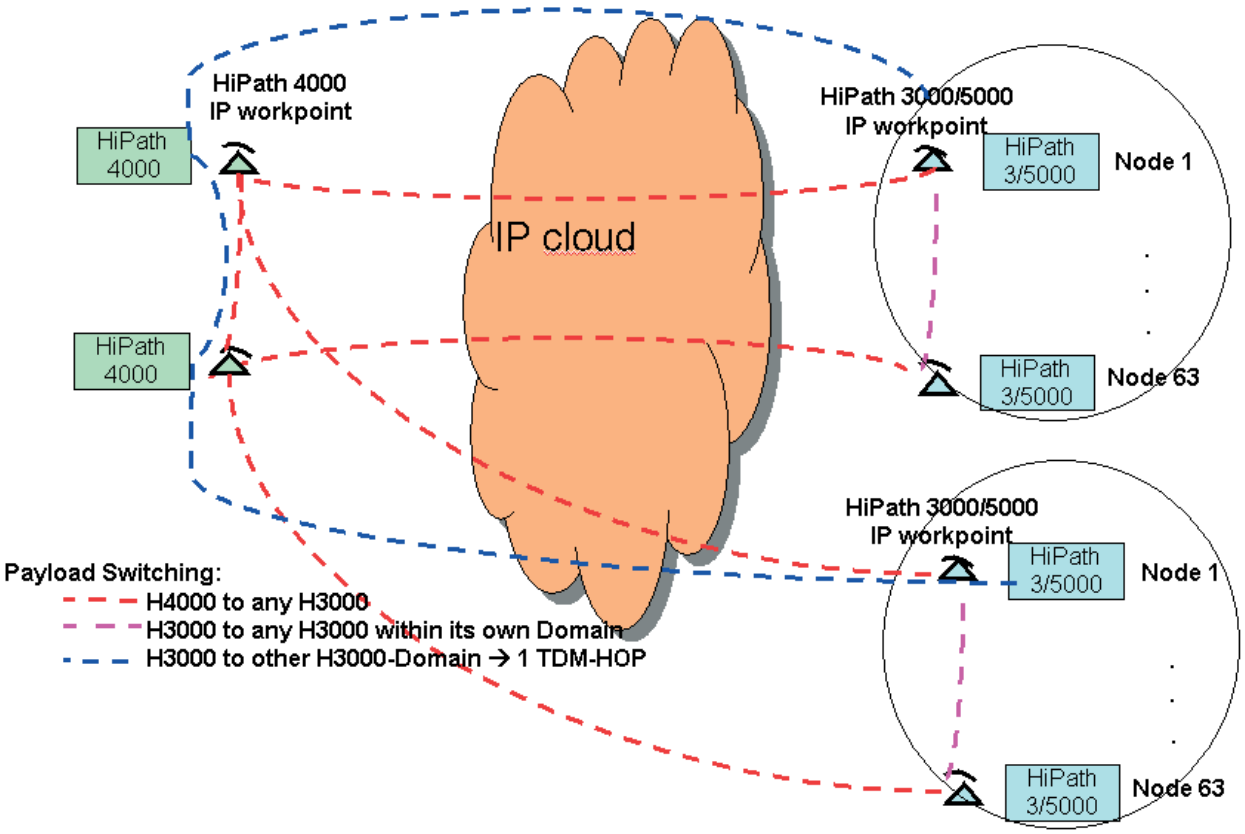
- The workpoints of gateway 2 and HiPath 5000 CS establish a closed numbering plan at location 2.
  Dialing from gateway 2 to 5000 CS: node number + internal number.
  Dialing gateway 2 or 5000 CS from the PSTN: subscriber line (location 2) + internal number (ISDN numbering plan).

- Workpoints at gateway 1 reach workpoints at gateway 2 or the HiPath 5000 CS via an ISDN numbering plan, i.e. they dial the CO number
- Workpoints at gateway 2 or the HiPath 5000 CS reach workpoints at gateway 1 via an ISDN numbering plan, i.e. they dial the CO number
- The HiPath 5000 RSM Feature Server cannot be implemented if an ISDN numbering plan is used
- Max. 64 nodes in the network
- HPCO cannot be implemented as there is an ISDN numbering plan
- As an alternative, ProCenter Agile can be used at one node
- Xpressions Compact cannot be implemented centrally as there is an ISDN numbering plan

4.10.8 Example 8

Payload Switching with IP Trunking

If there are more than 64 nodes or one domain, Codec G.711 must be implemented to ensure sufficient voice quality.



5 Serviceability

5.1 Overview

Introduction

This chapter describes the options available to the service technician and the customer for

- performing system administration tasks on site
- performing system administration tasks from a remote location (remote operation)
- performing service and maintenance tasks
- identifying faults

Chapter Contents

This chapter discusses the topics listed in the table.

Subject	
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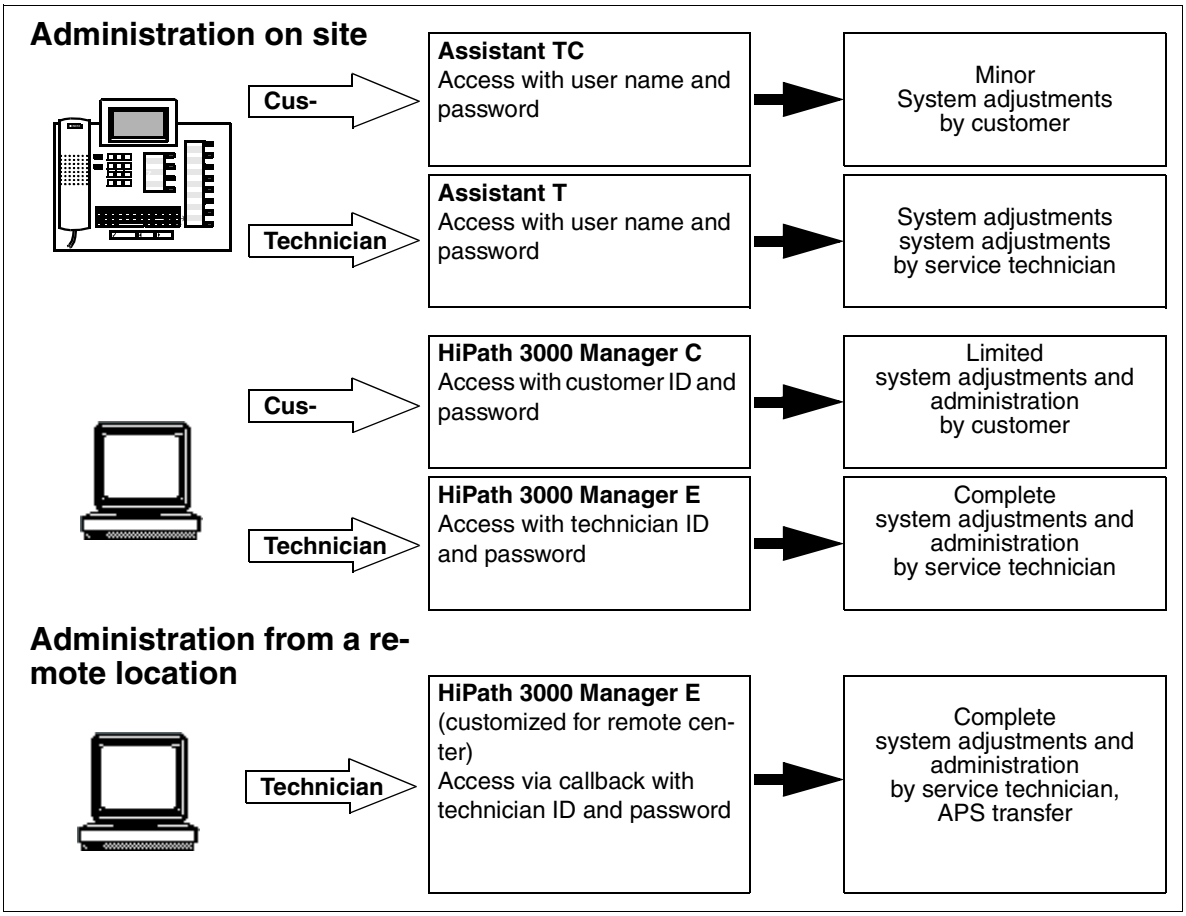
5.2 System Administration Options

Overview



5.2.1 System Administration from a System Telephone

All systems in the HiPath 3000/5000 product family can be administered to the full extent via a system telephone. The rights of the individual user will determine the extent to which he or she can perform administration tasks. Information on the various user groups and their access rights is contained in Section 5.3.10.2.

Administration by the Technician using Assistant T

This data area is password-protected to limit access to trained service technicians. With just a few exceptions, all system settings are available. Assistant T gives you the ability to make changes spontaneously on site, that is, without requiring any other tools.

You can only enter the service menu with a user ID and password.

Administration by the Customer using Assistant TC

This gives customers the option to perform a defined range of system settings themselves. These include, for example, configuring and changing speed-dialing destinations, and assigning names for stations and lines.

To protect individual customer data such as speed-dialing destinations or call detail information, it is not possible to enter the service menu unless you have user ID and password.

5.2.2 System Administration using the Service PC

Service tools with Windows user interface and integrated help functions are available for the economical modification of larger volumes of data and for setting specific system data. The rights of the individual user will determine the extent to which he or she can perform administration tasks. Information on the various user groups and their access rights is contained in Section 5.3.10.2.

You can access the communications platform using:

- ISDN adapter on the system telephone (64 kbps B-channel access)
- V.24 (RS-232) interface on the system (9600/19200 baud)
- Internal S_0 bus (64 kbps/CAPI 2.0)
- Remote access over an ISDN trunk (64 kbps B-channel access)
- Remote access over an analog trunk (integrated 14400 baud modem)

Technical Requirements for the Service PC

To implement the different service tools, the PC used must meet the technical listed in the following table.

PC Component	Requirement
CPU	PC must fulfill the minimum requirements of the operating system.
Monitor	VGA
RAM	PC must fulfill the minimum requirements of the operating system.
Hard disk	150 MB free capacity (minimum)
Floppy drive	3.5”, 1.44 MB
Serial interface	COM1, (COM2)
Mouse	Microsoft-compatible mouse
Printer	Any Windows-compatible printer
Operating system	Windows 98/2000/NT/XP

Administration by the Customer using HiPath 3000 Manager C

This allows the customer to administer customer-specific data using a PC. The user interface has been adapted from the HiPath 3000 Manager E interface and the help functions have been adjusted to the needs of the customer.

Administration by the Technician using HiPath 3000 Manager E

The service tool integrates the following function blocks:

- Acquiring and generating customer data (including off-line generation)
- Copying and backing up customer data
- Loading system software (APS transfer)
- Displaying stored error messages with error history
- Service orders, such as restarting boards, etc.
- Resetting activated features

- Creation and printing of:
  - Key labels for optiPoint 500 and optiset E telephones
  - Customer data printouts
  - Main distribution frame layout
- User and password administration for after sales service.
- Database conversion routine.

Access to the system using HiPath 3000 Manager E is only possible with a valid user name and associated password that have been entered in the system.

Online mode has been integrated to enable you to perform changes quickly. Its functionality corresponds to the Assistant T user interface.

Because sensitive system data can be processed, users are required to undergo the relevant training course before using the HiPath 3000 Manager E.

5.3 Options in the Service Department

5.3.1 Customer Database Backup (CDB Backup)

A distinction is made here between

- backup of customer data **without** HiPath Software Manager and
- backup of customer data **with** HiPath Software Manager.

5.3.1.1 Customer Data Backup Without HiPath Software Manager

Definition

CDB backup refers to saving the customer database CDB to the multimedia card MMC (HiPath 3000) or copying the cyclic RAM data and saving it in two PDS (Permanent Data Service) files (HiPath 5000).

5.3.1.1.1 Automatic Customer Data Backup

HiPath 3000

A two-stage concept guarantees automatic customer data backup.

A complete CDB backup version can be found on the MMC at any time. Deltas to this backup are stored in an SRAM area (with battery backup) in the central control board. If the SRAM area is full, the customer data is automatically backed up. This means that the entire CDB, including SRAM content, is copied from the SDRAM in the central control board to the MMC. The current CDB is simultaneously stored on the MMC along with the “old” CDB, which is not deleted until the current CDB is completely stored on the MMC.

In case of a power outage, the SDRAM content that has no battery backup is completely lost. However, by reaccessing the CDB backup on the MMC, the system’s database can be restored to the state it was in prior to the power outage.

Regardless of the volume of changes to the database, HiPath 3000 always performs an automatic complete CDB backup at midnight, system-time.

HiPath 5000

On the communication server, RAM data is copied automatically every three minutes and stored in the file `hicom.pds`. This file contains the complete data description of the HiPath 5000 with emulated HG 1500 boards. This includes:

- Customer data
- Trace
- error history
- Call detail data
- status data

5.3.1.1.2 Manual Customer Data Backup with HiPath 3000

You can perform a manual CDB backup using HiPath 3000 Manager E (in online mode) or Assistant T.

5.3.1.2 Customer Data Backup with HiPath Software Manager

Definition

The HiPath Software Manager supports, among other things, the backup of customer databases (Backup Manager) from all HiPath 3000/HiPath 5000 systems in the same customer network (see also Section 5.3.4, "Backing Up System Components (Backup Manager)").

The CDB backups are stored in a directory which must be defined in advance. The data backup can either be started manually immediately or performed at a predefined time. A cyclic backup, which saves the customer data at a set time every day, is also possible.

5.3.2 Relocate/Transfer Application Processor Software (APS)

APS replacement/transfer is not possible with HiPath 5000. You must perform a complete software upgrade.

For system software updates, a distinction is made between

- HiPath 3000 systems **without** HiPath Software Manager and
- HiPath 3000 systems **with** HiPath Software Manager.

For networked HiPath 3000 systems with HiPath 5000 Server, an APS update can only be performed with HiPath Software Manager.

5.3.2.1 APS Replacement/Transfer for HiPath 3000 Systems Without HiPath Software Manager

Two memory areas for the application processor software are reserved on the MMC. To be able to store two complete APS and to keep the transfer time as low as possible, part of an APS is stored in a compressed format. The APS is decompressed after it has been transferred from the MMC into the SDRAM area of the central control board.

5.3.2.1.1 Transferring an APS of HiPath 3000 by Replacing the MMC

APS replacement is only possible within a version and if a logical, compatible CDB is available.

5.3.2.1.2 APS transfer

Options

The APS Transfer feature is available with the HiPath 3000 Manager E. It facilitates

- an **on-site APS transfer** by connecting directly using the V.24 interface.
- an **APS transfer via remote service** from a central service center using the integrated analog or digital modem or via LAN.

5.3.2.2 APS Transfer for HiPath 3000 Systems With HiPath Software Manager

Definition

The HiPath Software Manager supports, among other things, updates of the system software (Upgrade Manager) of all HiPath 3000 systems in the same customer network. An update of the software of installed HG 1500 boards (HG 1500 V3.0 SMR-3 or later) can also be performed.

The following options are available under the menu item “Upgrade”:

- upgrade all HG 1500 boards and HiPath 3000 systems
- upgrade HG 1500 boards (HG 1500 V3.0 SMR-3 or later)
- upgrade all HiPath 3000 systems
  Note: The file format “*.fli” must be selected for APS transfer using HiPath Software Manager.

The software (APS and/or HG 1500) is updated in two steps. First, the new software is loaded to a system memory known as the "shadow area". This occurs in the background independently of the system status.

In the second step, the new software version must be made available, in other words, the switch from the current software version to the new software version must take place. The current software is replaced by the software in the shadow area and thus deleted. The changeover can either be started immediately once the software has been loaded or performed at a predefined time.

5.3.3 Determining System Information and Installed Software Components (HiPath Inventory Manager)

Definition

HiPath Inventory Manager is a service for detecting the installed software components and system information in a HiPath 3000/HiPath 5000 network. System information is only determined upon initial start-up of the service.

The relevant information can be displayed in table format by clicking one of the following buttons:

- Master Setup
  Information including version and installation date of the master setup.
- HiPath 3000
  Hardware and software information regarding the HiPath 3000 systems in the network and the installed HG 1500 boards.
- HiPath Applications
  Information regarding the following software components:
  - MS Windows components (MS Internet Explorer, DNS server, DHCP server)
  - Media Streaming
  - TAPI
  - CCMC, CCMS, CMD, CSP
  - Administration
  - HiPath 5000 Server
  - GetAccount
  - HiPath 3000 Manager E
  - Common Software
- Operating System
  Information regarding the current operating system.

All information can be updated at any time via the "Update data" button.

The system information is automatically determined when the HiPath Inventory Manager service is started for the first time. A cyclic update can be performed every $\geq$ 1 days. The system information can be queried manually at any time. This should always be done before an update/upgrade, for example.

5.3.4 Backing Up System Components (Backup Manager)

Definition

The HiPath Software Manager allows the following system components and databases of a HiPath 3000/HiPath 5000 network to be backed up:

- Full backup (= default setting)
  This option creates a data backup for all HiPath 3000 systems and HG 1500 boards in the HiPath 3000/HiPath 5000 network as well as databases (Feature Server, SQL Server).
- Backup HiPath 3000
  With this menu item, all HiPath 3000 systems in the HiPath 3000/HiPath 5000 network are displayed in an overview. It is possible to back up the data of a specific system or of all displayed HiPath 3000 systems.
- Database backup
  With this menu item, all databases (Feature Server, SQL Server) are displayed in an overview. It is possible to back up the data of one or of all database(s).

5.3.5 Diagnostics Options

5.3.5.1 Recording HiPath 3000 Board Status

5.3.5.1.1 Central Control Boards

Run LED

A RUN LED that displays the system's operating capacity is located on the central control board.

Options Available?

You can call up the following options using the HiPath 3000 Manager E:

- CMA
- CMS
- LIM
- IMODN
- MPPI, UAM (only with HiPath 3550, HiPath 3350) or UAMR (only with HiPath 3500, HiPath 3300)
  The presence of one of these announcement and music modules is displayed as "Option 5".
  The ALUM4 option cannot be displayed.

5.3.5.1.2 Power Supplies

Table 5-1 Power Supply Status Displays

Board	Status Display
HiPath 3800	
LUNA2	The LED displays the operating status (on or off).
HiPath 3750, HiPath 3700	
UPSM	The LED displays the operating status (on or off).
HiPath 3550, HiPath 3350, HiPath 3500, HiPath 3300	
PSUP	The LED displays the 5 V output voltage.
UPSC-D, UPSC-DR	• A green LED displays the 5 V output voltage. • A yellow LED displays the additional power of –48 V output voltage provided by an external power supply unit (EPSU2 or EPSU2R).

5.3.5.1.3 Peripheral Boards

View Status of Peripheral Boards

You can use HiPath 3000 Manager E or Assistant T to view the statuses of all peripheral boards. Display is limited to the following statuses per board:

- Board not inserted
- Board defective (not loaded)
- Board disabled
- Board enabled (active)
- Board busy (at least one station or line from this board is disconnected, is being called, or is busy).

For ISDN boards, the status of the reference clock is displayed:

- No reference clock
- Reference clock for clock generator is created.

When viewing the board status using the HiPath 3000 Manager E, all peripheral boards integrated into the system are presented in a table. The status display is updated every 3 seconds.

With the Assistant T, you can only view the status of one board at a time. You can also update the status display by pressing a key.

You cannot perform additional activities with the HiPath 3000 Manager E and Assistant T while viewing the status of a board.

Table 5-2 HiPath 3000 Manager E - Example of Status Display of Peripheral Boards

Slot	Board	not inserted	Defective	Locked out	Free	Busy	Clock source
1	STLS2			X		X	X
2	SLU8		X				
3	SLA4			X	X		
4	TLA8		X				
5							
6							
7	TS2			X	X		
8	16SLA	X					
9							
10	SLMO24				X		

HiPath 3750 and HiPath 3700: LEDs on Peripheral Boards

All peripheral boards are equipped with LEDs for displaying the status of a board or port. Information on the meaning of the individual LED statuses can be found in the descriptions of individual boards in the Service manual.

5.3.5.2 Recording HiPath 3000 Trunk Status

HiPath 3000 records the current status of each individual trunk in a table. If the status changes, the new status along with the time stamp is entered. You can use HiPath 3000 Manager E to view the trunk status, in which case the following information is provided.

Data	Content
Date	Date of the event (as stored in system)
Time	Time of the event (as stored in system)
Trunk number	Number of the trunk
Slot/Port	Slot and port number
Status	• Trunk status: – Inactive – Incoming call – Outgoing call – Trunk-to-trunk connection – Trunk disabled (using lockout switch or HiPath 3000 Manager E) – Trunk failure • Number of the connected station

5.3.5.3 Recording Station Status

HiPath 3000 records the current status of each individual station in a table. You can use HiPath 3000 Manager E to view the station status, in which case the following information is provided.

Data	Content
Station name	Name of the selected station
Slot, Port	Example: 7-1
Telephone model	Example: optiPoint 500 advance
Telephone status	Active or inactive
DID number	External number of the selected station
Voice	Menu language of selected station
Connection status	• Inactive: The telephone is idle. • Busy: The telephone is off the hook, but not yet dialed. • Waiting: The telephone call is in the queue. • Connected: The telephone is connected to a second telephone with a trunk or a hunt group member. • Holding: The telephone is on hold. • Error: The connection cannot be established due to an error (for example, invalid telephone number). • Call: The telephone is called.
Connected to	The number of the connected station or trunk
Forwarding status	• Off: No call forwarding activated. • Internal: Call forwarding activated only for internal calls. • External: Call forwarding activated only for external calls. • All: Call forwarding activated for all calls.
Destination	Number of call forwarding destination

Data	Content
Activated features	Status of activated features (on or off): • Do not disturb • Call forwarding (device status) • Advisory text • Room monitor • Code lock • Station number suppression • Group ringing • Ringer connection • Hunt group • Silent call waiting • Handsfree answerback • Call waiting release • Transfer of ringing (only for MULAP) • Call forwarding MULAP (only for MULAP)
Connected station	List of the connected stations

5.3.5.4 Recording the Status of the HiPath 3000 V.24 Interfaces

You can use HiPath 3000 Manager E to view the current status of the V.24 interfaces, in which case the following information is provided.

- Status of the trunks (1 = active trunk, 0 = inactive trunk)
  The individual trunks are assigned as follows:
  DTR = HiPath 3000
  DSR = Telephone
  RTS = HiPath 3000
  CTS = Telephone

  This means, for example, that incorrectly connected or damaged cables can be determined (for more information on this, refer to the HiPath 3000 Manager E Help.).

- V.24 Monitoring
  The number of sent/received bytes within a selected time period can be recorded and then displayed/saved using a text editor (default = MS WordPad®).

The failure and restart of a V.24 interface generates an entry in the eventlog and releases a remote error signal (V.24 failure = “Check printer” error message, V.24 restart = Withdrawal of error message).

5.3.5.5 Trace Options for HiPath 3000

Special user rights are required for activating the Trace setting in the Maintenance menu, that are exclusively reserved by the user group Development.

Tracing ISDN Activities

This feature allows the user to trace ISDN telephones (subscriber ports) and ISDN trunks (trunk ports) in real time. ISDN activities are routed to HiPath 3000 Manager E and saved in a trace file. Only the ISDN sequences are displayed on the monitor, not the content of the ISDN messages.

The call is made via HiPath 3000 Manager E: Maintenance, "Call Monitoring" tab. The Start button starts Call Monitoring, whereupon the data of all available ports in the system is read out.

If the trace session is over, you can start the **ISDN Message Decoder** (ISDN Tracer) and use it to convert the trace file into a readable format (only English). You can also read out the trace data using remote service.

The ISDN Message Decoder is a 32 bit application which converts the ISDN layer 3 messages and information elements into a readable format. Since you cannot find out from the trace file whether it deals with an information element from a Euro ISDN or a QSig configuration, you have to select the protocol. You may select the following settings from the main menu:

- Raw (default setting)
- Euro ISDN
- QSig V1
- CorNet-NQ

With the “Raw” setting, the Hex values are only decoded, not interpreted. With the other two settings, the Hex values are decoded and interpreted per feature (CC, AOC, ...).

Tracing Call-related Activities

You can trace all activities from any telephone, trunk, etc., that is released by a call. These include consultation calls, conference calls, and hunt groups, for example.

5.3.5.6 HiPath Manager PCM Trace Monitor for HiPath 5000

Communication between the different HiPath 5000 applications is organized using various buffer tables and messages. You can monitor the individual entries in the different buffer tables, exchanged immediate messages, program and communication messages for the relevant component in a separate trace window, in other words, a separate window is opened for each component (application).

The trace windows can be viewed using the Trace Monitor and swapped out for further processing.

This documentation does not cover interpretation of the trace window contents by the Trace Monitor. Trace files are used for problem analysis and are interpreted by Service Support during servicing.
The description below can be used to determine the work steps required for Trace Monitor navigation and control and for swapping out the trace contents to a file.

Trace messages can be displayed for the following HiPath 5000 applications:

- Feature Server
  Two trace files are available:
  - `\winnt\system32\carlogfile.txt`
    provides details on which HG 1500 boards have logged on to the network and when.
  - `\winnt\system32\rgtracefile.txt`
    provides details on when the individual HG 1500 boards were assigned a station number.
- Presence Manager
  Two trace files are available:
  - `\winnt\system32\dssdiagnosefile.txt`
  - `\winnt\system32\dsslogfile.txt`
- HiPath Manager PCM Administration
  Administration of the configuration parameters for component control by the user, for general parameters, for call charge evaluation and analysis.
- HiPath Manager PCM
  Configuration of call handling and call forwarding using definable profiles.
- HiPath GetAccount
  Internal component that is responsible for evaluating and saving call charges and for immediate printing.

5.3.5.7 Eventlog for HiPath 3000

HiPath 3000 features an eventlog where accrued errors are classified according to error class and error number with the date/time of the original error. You can use HiPath 3000 Manager E to read out the eventlog.

5.3.5.8 Testing Telephones

After startup and country adaptation, you can activate the terminal test on any optiPoint 500 or optiset E telephone using a code or the service menu. This test checks the display (your number is displayed), LEDs, and calls. The tests ends automatically after a period of time. During the test, you can satisfy yourself that the visual and audio components function properly.

Test procedure on the system telephone

Table 5-3 Terminal test

Step	Entry	Explanation
1.	*940	Code for terminal test
2.	–	For approximately five seconds, all LEDs blink quickly (except for the Service menu LED), all display pixels are activated, and you can hear a tone.

If the test does not react as described, an additional power supply (plug-in power supply unit) for the relevant system telephone may be necessary.

If the time and date do not appear in the display after startup, either the system telephone or the cable path is defective. Either exchange the system telephone or check the cable path.

5.3.5.9 Event Viewer for HiPath 5000 (Eventlog)

Introduction

The Event Viewer (Eventlog) is one of the tools supplied with NT-based operating systems (Microsoft Windows NT, Microsoft Windows 2000, Microsoft Windows XP, etc.). The Event Viewer administers logs that record information on programs, security, and system events on the computer. You can use it to display and administer eventlogs, to gather information on hardware and software problems, and to monitor security events.

You can use this standard tool to obtain status information for the HiPath 5000 server and any application server present.

All events associated with the server(s) and its (their) applications are saved. The events provide a quick and, above all, time-specific overview of all relevant actions (status, information, warning, error, etc.).

The tool itself handles the event entries. You can specify the length of the event file, the validity of events in days, the reaction when the maximum size has been reached, and the display filter, for example.

You can save the resulting event file (log file) under any name.

Starting the Event Viewer

Start the Event Viewer from the Windows Start menu: `Start/Programs/Administrative Tools/Event Viewer`

5.3.5.10 HiPath 5000State Viewer

The current status of the HiPath ComScendo service and all associated services can be checked via the state viewer.

This is invoked via `Start/Program Files/HiPath/HiPath 5000 Status Display`.

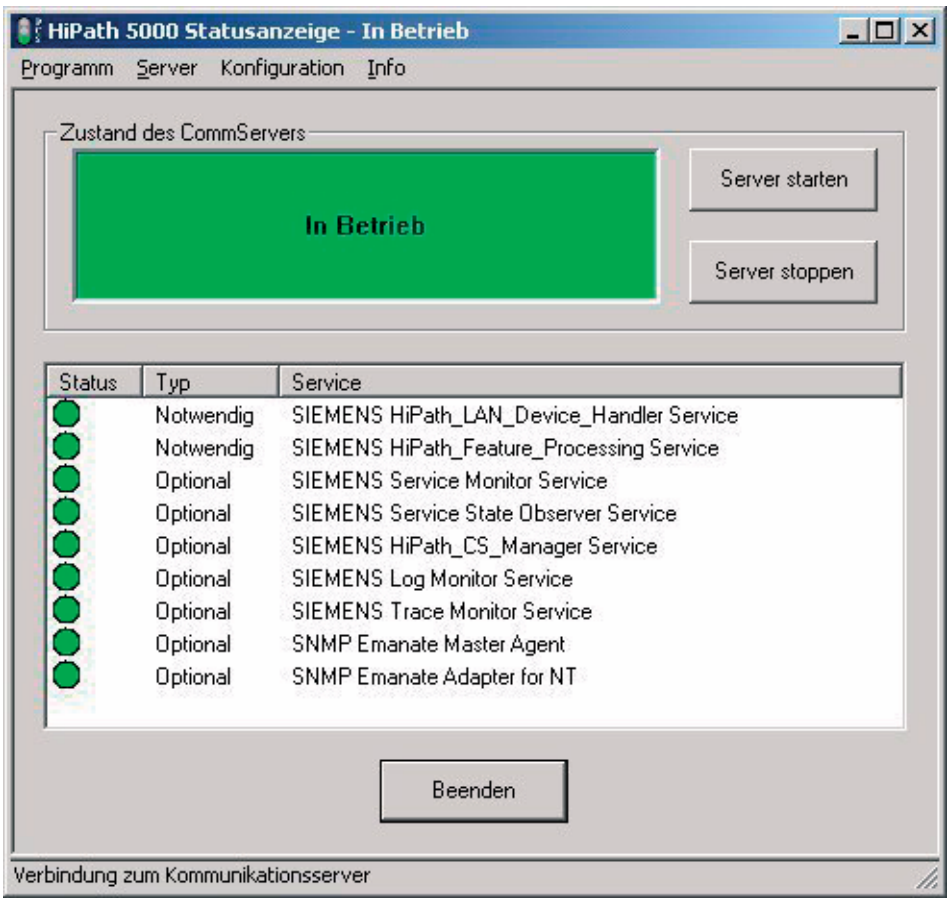


Figure 5-1 HiPath 5000State Viewer

The example in Figure 5-1 illustrates the correct operation of a HiPath ComScendo service. For the server itself ("= in operation") and all services, the "status indicators are green".

5.3.5.11 HiPath Fault Management

HiPath 3000 and HiPath 5000 systems have a separate SNMP agent that allows access to various system data that is stored in its MIB or Management Information database. The MIB provides basic system information, status information, event-related data, and information on installed hardware (slots) and configured connections (ports).

HiPath Fault Management can read information from the HiPath 3000 and HiPath 5000 system MIB via SNMP requests. This allows the system to permanently monitor the status of the network components and to include changes of status in the network administrator information.

A graphic map of the network displays the topology and the current status of the network components.

For detailed information, refer to the product-specific documentation for HiPath Fault Management.

SNMP Functionality

Simple Network Management Protocol (SNMP) represents a convenient platform within the TCP/IP protocol family for management tasks in the HiPath 3000 and HiPath 5000 software. SNMP is used more or less as a management agent on HiPath 3000 and HiPath 5000 and handles central monitoring and administration of LAN network components, including the HiPath 3000 and HiPath 5000. This involves

- address the HiPath 3000 and HiPath 5000 over the TCP/IP protocol family.
- access data from external management applications such as HiPath Fault Management.
- implement remote maintenance jobs (such as online port status, disabling and enabling ports, and determining free ports).
- transmitting service-related class B errors
- visualize the operating status of a HiPath 3000 and HiPath 5000.

5.3.5.12 Licensing Analysis

This documentation does not cover interpretation of the analysis data. Trace files, log files, etc. are used for problem analysis and are interpreted by Service Support during servicing.

5.3.5.12.1 Analysis Using Customer License Manager (CLM)

The CLM installation directory (for example, `C:\Program Files\licensing\license manager`) contains the `Trace` directory among other things. Each time the TomCat Web server is started, a new subdirectory is created to which the trace output is then written. Trace output can be viewed using MS Internet Explorer.

5.3.5.12.2 Analysis Using Customer License Agent (CLA)

The CLA offers two analysis options:

Log files

The Customer License Agent (CLA) manages a configuration log and error log. Both logs are viewed using the CLM. This provides a good overview of an error situation that helps to narrow down an error to a specific area, for example.

Trace files

The CLA records detailed information about its internal processes in a text file that is stored in the `bin` subdirectory of its installation directory. The degree of detail (off, low, standard, all) and the size (in MB) of this recorded information can be defined using the Customer License Manager (CLM).

5.3.5.13 Analysis Using HiPath Software Manager and HiPath Inventory Manager

This documentation does not cover interpretation of the analysis data. Trace files, log files, etc. are used for problem analysis and are interpreted by Service Support during servicing.

Trace files

The installation directory of the Common Web Service (default = `C:\Program Files\siemens\hipath\commonweb`) contains, among other things, the `Trace` directory, in which the trace files for the Web applications HiPath Software Manager and HiPath Inventory Manager are stored.

This directory name is saved in a registry key during installation. If this key cannot be accessed, the trace files are stored in the temporary system directory (as the Common Web Service is started as a system service). Under MS Windows 2000, this directory normally has the name `C:\WINNT\temp`, while under MS Windows 2003 it is called `C:\WINDOWS\temp`.

Each time a Web application is started by the Common Web Service (TomCat Web server), a separate subdirectory is created. This subdirectory contains the trace files in XML format. The subdirectory name follows the convention `date_<DATE>_time_<TIME>`.

5.3.6 HiPath 3000 Error Messages (Entries in the Eventlog for HiPath 3000)

Classification

Accrued errors are classified according to error class and error number. The three different error classes are described below:

- **Error Class A** = Customer-related error
  HiPath 3000 Manager E fails to issue a signal/message. Class A errors are indicated on the optiPoint Attendant display. The customer can correct them without service support.

  The following error messages are implemented at present:

  – “Printer Alarm” (caused by empty paper tray, for example)

  – “Fan Failure” (caused by failure of the fan with HiPath 3500 or HiPath 3300)

  – “Revisor Alarm” (caused by overflow in the MMC log area, for example).

  – "Too Many Key Modules" (caused by attaching more than the maximum possible number of optiPoint key modules)

- **Error Class B** = Service-related errors
  Class B errors are signaled to the HiPath 3000 Manager E, and can be automatically forwarded to a service center.
  Errors of this class are, for example, failure of the boards, individual ports, or trunks. You can generally correct these errors by replacing the hardware, reconfiguring the customer database, or by working together with the carrier.

- **Error Class C** = Development-related errors
  HiPath 3000 Manager E fails to issue a signal/message.
  Class C errors require diagnosis and problem analysis by specialists.

5.3.7 HiPath 5000 Error Messages (Event Viewer Entries for HiPath 5000)

Event Viewer Entries for HiPath 5000

- Feature server events
- GetAccount events
- HiPath Manager PCM events

5.3.8 Error correction

5.3.8.1 Automatic Error Correction

One of the below recovery actions is assigned to each error in the error memory. These recovery actions are programmed to automatically correct errors that occur.

- Hard restart
- Reload board
- Reload CDB backup
- Port lockout
- Power failure transfer (loop start)
- None

A watchdog activates continuous loops.

If no recovery measure is assigned or if the one that is assigned fails, a service technician has to correct the error manually.

5.3.8.2 Manual Error Correction Without HiPath 3000 Manager E

Manually Activating Restart (Reset)/Reload

Pressing the reset button on the central control board

- initiates a **Reset** (Hard restart of the entire system with the current CDB) if the button is pressed for less than 5 seconds. The Run LED lights up when the Reset button is pressed.
- initiates a **Reload** if the button is pressed longer than 5 seconds. The Run LED disappears after approximately five seconds as verification that the reload has been initiated. The entire content of the customer database is replaced by its default version. All country and customer-specific settings are lost.

Locking out and Releasing Boards and Ports

You can lock out and release ports using the lockout switch located on the board. The lockout prevents renewed seizure after the current connection has finished. It creates

- a port lockout in an outgoing direction on analog trunk boards.
- a port lockout in outgoing and incoming directions on trunk boards.
- a lockout of the entire board for subscriber line modules.

5.3.8.3 Manual Error Correction With HiPath 3000 Manager E

Initiating Restart (Reset)

This initiates an immediate hard restart of the entire system with the current CDB.

Initiating Reload Card

This the single board (loading Loadware) to reload.

Locking out and Releasing Boards and Ports

HiPath 3000 Manager E enables you to lock out an entire subscriber line module or line circuit module and individual ports. The lockout prevents renewed seizure after the current connection has finished. Lockout or release settings are also retained after a reset.

You cannot lock out the first SLMO/SLU board because administration through the Assistant T uses its first two ports.

If you try to lock out the last active trunk, you will be notified that remote service through the service center is no longer possible.

You cannot use HiPath 3000 Manager E to release boards and ports locked out with the lockout switch.

ALUM

You cannot initiate a power failure transfer to analog telephones using HiPath 3000 Manager E.

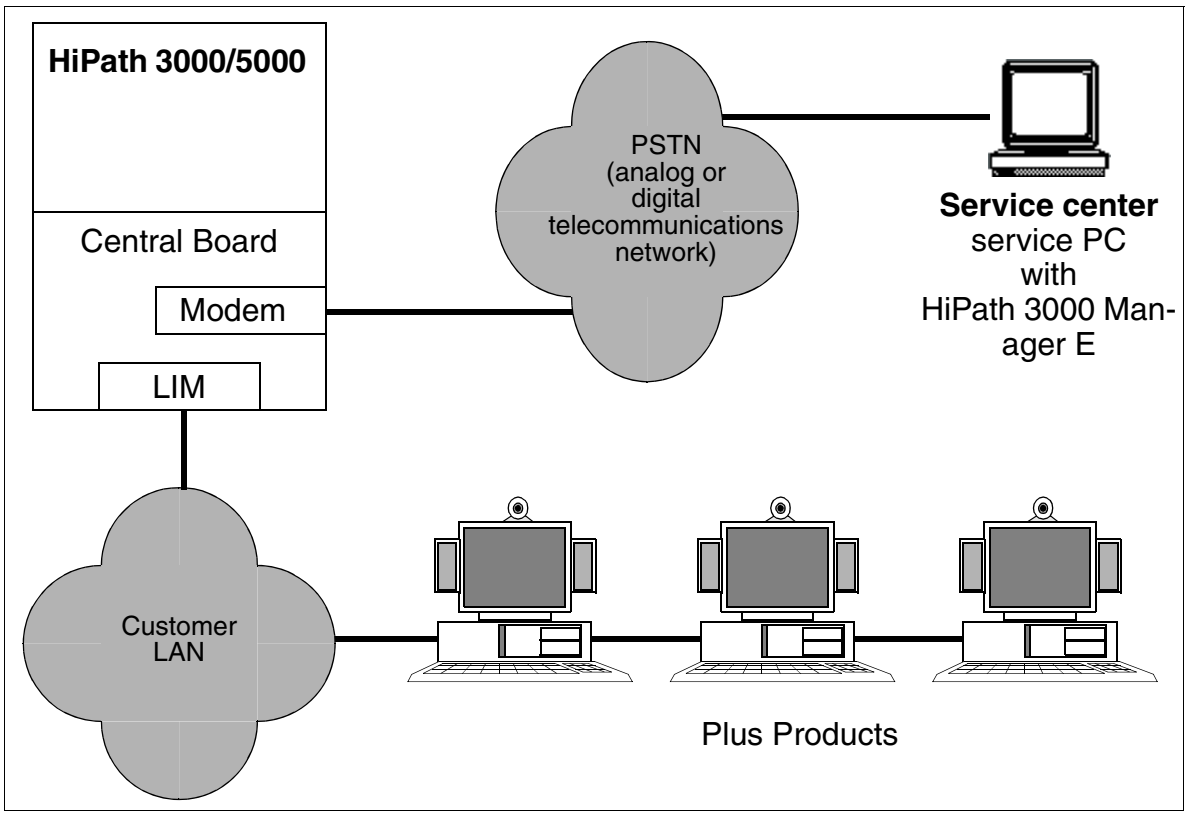
5.3.9 Remote Service

Definition

Remote service is described as communication between the service center and HiPath 3000/ 5000 using public telecommunications networks to fulfill service tasks. These tasks are

- remote system administration,
- remote administration of Plus products via the system,
- remote correction of system software (APS transfer),
- automatic signaling of error messages.

Remote service facilitates the administration and maintenance of various communication systems from a central location. You can establish a connection to the system via an integrated digital modem
(B channel) or an integrated analog modem (IMODC) or via HG 1500.



5.3.9.1 HiPath 3000 Connection Options

- HG 1500
  All HiPath 3000 systems can be accessed remotely with a LAN-LAN link via the HG 1500 board.
- Integrated analog modem IMODN
  This modem enables remote access to all systems in the HiPath 3000 product line. Access is achieved using any trunks, tie trunks, and all subscriber lines. IMODN is designed as a plug-in card.

  Caution
  Be sure to disconnect the system from the power supply before removing or inserting integrated analog modems (IMODN).

  The IMODN is treated as a pseudo port. It receives a number in the system that can be reached internally through direct internal dialing (DID). You can cancel the DID number manually to prevent external access.
- Integrated digital modem (B channel)
  An integrated B channel modem is available with all systems in the HiPath 3000/5000 product line. This type of modem facilitates remote access using both digital trunks, tie trunks, as well as S_0 subscriber lines. Data transmission is supported according to Protocol X.75.

  The digital modem is treated as a pseudo port. It receives a number in the system that can be reached internally and through direct internal dialing. You can cancel the DID number manually to prevent external access.

Access to the analog/digital modem

The customer must enable the access to both modems by entering a six-digit PIN code. If the service center is to make a connection to the HiPath 3000/5000 over a modem, it may be necessary to enter this individual code. It depends on which trunk type is used for the modem access. The following applies to the system default:

- Access over ISDN trunk = enable procedure: customer must enter PIN code.
- Access over another trunk = login without code: PIN code is not necessary.

If necessary, the system administration (only by using Assistant T) can reset the PIN code back to the default value.

5.3.9.2 HiPath 5000 Connection Options

In general, the connection to HiPath 5000 is established via special software programs, such as pcANYWHERE. Please refer to the relevant product documentation for information on possible applications.

If the customer agrees, Remote Access Service RAS can also be used, provided this service is active on the HiPath 5000 server.

5.3.9.3 Remote System Administration

Remote Administration with HiPath 3000 Manager E

To establish a remote connection between HiPath 3000/5000 and the service center (HiPath 3000 Manager E), the following options are available:

- Callback
- Service call via code
- Automatic error signaling

Any one of these options establishes a connection using the integrated digital modem (B channel) or the integrated analog modem (IMODN).

Callback

HiPath 3000/5000 can manage up to 6 different callback indices (callback passwords and their relevant callback numbers), in which case the first callback connection is also the destination of the automatic error signaling. For each callback connection, you can select either the digital modem (B channel) or the analog modem (IMODN).

Service call via code

You can use any telephone to initiate a HiPath 3000/5000 service call to the service center by selecting the connection setup option “Service call using a code” and activating the feature “Remote access immediately after installation”. In contrast to the usual callback procedure, this callback (service call) is not activated by HiPath 3000 Manager E itself, but by any telephone you choose. Callback initialization is essentially skipped.

The service call destinations are the six callback indices that also apply to callback. You are not required to enter the relevant passwords.

Automatic error signaling

Error Class B errors can be transferred to a service center automatically. For more information on this, see Section 5.3.9.5.

DTMF Remote Administration

This feature facilitates remote system administration by transmitting DTMF signals. The user interface (menu prompt) is the same as that of the Assistant T for system administration on site. DTMF remote administration can be performed using either the analog or digital trunks.

5.3.9.4 Remote Correction of System Software (APS)

The service center performs the APS transfer.

5.3.9.5 Remote Error Signaling

Error Class B errors can be transferred to a service center automatically. To do this, the “Error signaling” flag has to be activated and a number entered under the callback index 1.

The error report consists of one header and the error information that is transmitted in binary form. The header contains a unique identifier that recognizes the customer system that sent the error reports.

5.3.9.6 Remote Administration and Access Using PPP

You can establish a connection between the system/Plus product and the service center using either the integrated digital modem (B channel) or the integrated analog modem (IMODN). Data is exchanged in both cases using Point-to-Point-Protocols (PPP).

For more detailed information on the possible functions, see Chapter 4, "HiPath 3000/5000 in the LAN Network".

Remote System Administration

You can also operate HiPath 3000 Manager E in conjunction with the relevant infrastructure (RDT network, router) using PPP.

For more information on this, see Section 4.9.4.

Remote Administration of Plus Products

You can use HiPath 3000/5000 to administer Plus Products from a central service center. HiPath 3000/5000 merely provides the transmission medium for this. The actual Plus Product administration is performed via special software programs, such as pcANYWHERE.

For more information on this, see Section 4.9.5.

Remote Error Signaling Using SNMP

Plus products and the HiPath 3000/5000 can transmit error messages (SNMP traps) to the service center.

For more information on this, see Section 4.9.2.

5.3.10 Access Security

5.3.10.1 Logon With User Name and Password

Security

To ensure that authorized users have access to the HiPath 3000/5000 and to prevent unauthorized accesses, users must be identified by a user name and authorized by a password. This applies to all local and remote administration and maintenance procedures using HiPath 3000 Manager E, Assistant T, HiPath 3000 Manager C, Assistant TC, and AMHOST.

After the first system startup and during country initialization, you can select between the following security options:

- variable password (default)
- fixed password concept

variable password

Up to 16 users can be assigned their own user ID with individual name, password, and a user group consisting of six pre-determined user groups. Only the data authorized for the relevant user group can be read and administered.

During the first login, the system requests the identity of the user and asks for a new password (max. 15 characters from the optiPoint 500 character set). This then overwrites the default user name (31994) and default password (31994). This first user is then automatically assigned to the user group “System Maintenance”. The system informs the user that no user is configured in the system and that the user has been assigned with “System Maintenance” authorization. Using HiPath 3000 Manager E or Assistant T, additional users and their passwords can be configured in the user administration.

If a user forgets a password, it has to be deleted and reconfigured by a different authorized user. If all authorized users forget their passwords, the system must be regenerated.

Fixed Password

When using the fixed password, only fixed user groups with unchangeable default user names and default passwords are used. Also, new users cannot be configured in the user administration.

Changing Password Types

Only with Assistant T can you change from a variable password to a fixed password type and vice versa. To do this, you have to re-initialize the country settings. This switches the entire content of the customer database (including user names and passwords) to a default state.

If you perform country initialization in a system with a variable password, the previously created user names and passwords remain intact as long as you do not subsequently change the password type.

If a CDB is read from a system in which the default user names and passwords were changed, this CDB cannot be loaded into a HiPath 3000/5000 system that was changed to a fixed password type. Before reading this CDB, you have to set up a user (user name and password) in the system that matches a user group with a fixed password. Once this user has been set up, the CDB can be read from the HiPath 3000/5000 . With this user name and ID, you can now load the CDB into the system switched to the fixed password type.

5.3.10.2 Pre-determined User Groups and Their Access Rights

User Groups With a Variable Password

The following table shows the six pre-determined user groups and their access rights.

Table 5-4 Variable Password: Pre-determined User Groups and Their Access Rights

No.	User groups / User rights	User admin.	Audit	System maint. (Service)	Customer admin. (Customer)	Accounting	Dev-elopment
1.	• Setting up/deleting users • Assigning users to user groups	X		X[1]			
2.	• Assessing and archiving backup-related log files • Reader rights to system data (error memory, for example), not including confidential customer information		X	X[2]			
3.	• Access rights to all system data (not including development access rights) as long as no users are assigned to other user groups.			X			
4.	• Access rights to confidential customer information • Executing customer actions (printing out certain lists, for example)			X[3]	X		
5.	• Access rights to non-confidential customer information			X	X		
6.	• Access rights to parameters and call detail recording actions (not including interface parameters for the output device)			X[3, 4]	X[4]	X	
7.	• Access rights of the “System Maintenance” user group • Setting up and reading certain parameters to which no other user group has access.						X

1 As long as no user is assigned to the “User Administration” user group.
2 As long as no user is assigned to the “Audit” user group.
3 As long as no user is assigned to the “Customer administration” user group.
4 As long as no user is assigned to the “Accounting” user group.

User Groups With a Fixed Password

The following table shows the unchangeable user groups and their rights.

Table 5-5 Fixed Password Concept: Fixed User Groups and their Access Rights

No.	User groups User rights	System maint. (Service) Name/Password= 31994/31994	Customer admin. (Cust.) Name/Password: – Manager TC=*95/(Password not necessary) – Manager C=office/office	Development
1.	• Assessing and archiving backup-related log files • Reader rights to system data (error memory, for example), not including confidential customer information	X		X
2.	• Access rights to all system data (not including development access rights)	X		X
3.	• Access rights to confidential customer information • Executing customer actions (printing out certain lists, for example)	X	X	X
4.	• Access rights to non-confidential customer information	X	X	X
5.	• Access rights to parameters and call detail recording actions (not including interface parameters for the output device)		X	
6.	• Setting up and reading certain parameters to which no other user group has access.			X

5.3.10.3 System Access Options

The user's access rights, in other words the data that the user may read or manage, always depend on the user group to which the user is assigned.

Service Tools

- Assistant T and Assistant TC
  Log on by entering your user name and password
  (independently of the lock code)
  The system can only be accessed using the first two $U_{P0/E}$ connections from the first SLMO/SLU board in the system.
- HiPath 3000 Manager E and HiPath 3000 Manager C (local)
  Log on by entering your user name and password
- HiPath 3000 Manager E (remote), direct connection
  Log on by entering your user name and password
  The system can be accessed directly using the integrated digital modem (B channel) or the integrated analog modem. However, the user is required to establish a 5 digit access code beforehand.
- HiPath 3000 Manager E (remote), callback connection
  Log on by entering your user name and password
  The system can be accessed using the integrated digital modem (B channel) or the integrated analog modem. However, you have to set up a callback index beforehand.
- HiPath Software Manager
  Log on by entering your user name and password

AMHOST

The AMHOST (Administration and Maintenance via HOST) feature allows Plus products to read certain system information and to change it, if necessary. To enable Plus products to access the system, you have to set up a user without a user group in the HiPath 3000/5000 default user administration. Enter "AMHOST" as the user name and "77777" as the default user password.

You can only change this password if the system is configured using a variable password. In this case, delete the "AMHOST" user and reconfigure the system with the same user name and a new password.

5.3.10.4 Customer Data Security

When saving a customer database on the hard disk, a user table (part of the user administration) with user name and encrypted passwords are also saved. This guarantees access security when the customer database is opened offline later on.

When opening the customer database offline, you are requested to enter your user name and password. The data that you enter is compared to the data in the user table. In this case, the user group verified during this process also determines the access rights.

When loading an offline customer database into HiPath 3000/5000 , the user table that goes with it should not be loaded into the system. Otherwise, the system-specific user administration would be distorted.

5.3.11 Automatic Logging of Administration Procedures

Definition

All accesses to customer-related data in the HiPath 3000/5000 are automatically logged in an area of the MMC (LOG area) reserved for this purpose. The information recorded includes who the user is, the data manipulated by the user, and the time. An authorized user (member of the "Audit" user group) can transfer the system data to a PC and assess it.

5.3.11.1 Logging

A log entry contains the following information:

- Date and time
- User name and user group
- Type of activity (format identification) and activity (command entry)

5.3.11.1.1 Format Identification and Command Entry

The following format information is logged:

- Assistant T (1)
  All activities are logged, regardless of system access. The respective code with the most important parameters is recorded as the command entry (station/number, for example).
- Assistant TC (2)
  Same as Assistant T (1)
- Session Information (3)
  The system access is logged, regardless whether it is logged using Assistant T, HiPath 3000 Manager E, or other HiPath systems. Possible command entries are:
  A0-1 = Login procedure
  A0-2 = Logout procedure
  A0-3 = Unauthorized login attempt
- HiPath 3000 Manager E Database (4)
  Access to the database is logged using HiPath 3000 Manager E. Possible command entries are:
  A1-1 = Database read
  A1-2 = Regeneration of CDB (Load CDB into the system)
  A1-3 = Write database
- Program Systems (5)
  APS transfers and system boots (first bootup, for example) are recorded. Possible command entries are:

– A2-1 = APSXF started
– A2-2 = APSXF ended
– A2-3 = APS boot (APS stamp also included)

- HiPath 3000 Manager E Maintenance (6)
  Maintenance activities which can be assigned with the following command entries are logged:
  – B1-1 = Read error memory
  – B1-2 = Delete error memory
  – B2-1 = Out of service
  – B3-1 = Read Direct Memory Access
  – B3-2 = Write Direct Memory Access
  – B4-1 = Delete base station status overload
  – B4-2 = Delete base station restart
  – B5-1 = Digital loopback change
  – B6-1 = Trunk rolling change
  – B7-1 = Read trunk status
  – B8-1 = Delete trunk error counter

- Simulated or pseudo Assistant T format (7)
  The HiPath 3000 Manager E records the offline changes of a CDB as a “simulated” Assistant T command. For data areas subject to change by HiPath 3000 Manager E, pseudo areas are generated. When loading an offline CDB into the system, the following simulated commands are logged as command entries:
  C1 = Pseudo area “System parameter”
  – C1-1 System fags/CMI
  – C1-2 System intercept/AC
  – C1-3 Tones and calls
  – C1-4 Direction flag special (Variable direction#)
  – C1-5 System settings
  – C1-6 Host Link Interface
  – C1-7 Relocate activation
  C2 = Pseudo area “System timer”
  – C2-1 System timer
  C3 = Pseudo area “S_0 configuration”
  – C3-1 Station bus
  – C3-2 Line supervision
  – C3-3 Mode
  C4 = Pseudo area “Lines”
  – C4-1 Loop start parameter (Variable Slot/Line#)
  C5 = Pseudo area “Digit analysis”
  – C5-1 Internal number (Variable Stn#, Grp#)
  – C5-2 Service codes
  C6 = Pseudo area “Summer time”
  – C6-1 Summer time

C7 = Pseudo area “Directions”
– C7-1 Direction flags (Variable direction#)
C8 = Pseudo area “Door setup”
– C8-1 Door setup (Variable door#)
C9 = Pseudo area “UCD Flags”
– C9-1 UCD Flags
C10 = Pseud area “Delete system counter”
– C10-1 Delete system counter

- HiPath 3000 Manager E online (8)
  Archives from the log file and the user administration are logged. Possible command entries are:
  – D1-1 = Archive
  – D2-1 = New user
  – D2-2 = Delete user
  – D3-1 = Change password

Logging External Accesses (Solutions, Applications)
Plus products used with “AMHOST” can only make limited changes. Because these changes ’automatically’ run simultaneously (Check In and Check Out for hotel solutions, for example), these are not logged. Only the session information (user name is “amhost”) with the command entries “Login procedure” and “Logout procedure” are logged.

5.3.11.2 Issuing and Saving Log Data

Data is automatically logged in an area (LOG area) on the MCC reserved for this purpose. It cannot be switched off.

If approximately 80 % of the MMC log area capacity is exceeded, a Class A error is issued. This error is dealt with like all Class A errors and is displayed on the optiPoint Attendant as “Revisor Alarm.”

The log should now be read out and archived, in other words it should be saved in an archive file (file extension = arc). If an archive is not created, the oldest datablock is overwritten if there is a danger of overflow.

You can only issue log entries using HiPath 3000 Manager E. You cannot retrieve the log entries from the system until you have logged on as a user with “Revisor” rights.

Archive

If you request an archive (storage), the system checks whether or not there is already an archive file (file extension = arc). If it is a file with log data from a previous archive, the file must match the current customer. In case of a positive result, the system log entries are retrieved and attached to the existing data in the archive file. At the same time, the data in the system is deleted.
If malfunctions occur during this procedure (for example, line interruption), the entire procedure ends and the archive has to be restarted.

If no archive is requested, the revisor can retrieve, view, and print the log entries. However, log entries remain in the system.

Multimedia Card (MMC)

When replacing the multimedia card, the following applies:

- If the memory area for logging data is empty, logging restarts.
- If the memory area for logging data is not empty, logging continues.

Example of a Log Printout

The following assumption applies as an example: The first system boot up has taken place. Customer-specific programming was completed.

1050	00-11-25 15:57:10	rev(R)	(6)D1-1	Archive
1051	00-11-25 15:58:22	rev(R)	(3)A0-2	Logout procedure
1052	00-11-26 09:20:15	serv(S)	(3)A0-1	Login procedure
1053	00-11-26 09:21:35	serv(S)	(4)A1-1	Database read
1054	00-11-26 09:21:52	serv(S)	(7)14-12-*(20)	Station name
1055	00-11-26 09:22:45	serv(S)	(4)A1-3	Write database
1056	00-11-26 09:23:25	serv(S)	(3)A0-2	Logout procedure
1057	00-11-26 10:10:15	pnkm(A)	(3)A0-1	Login procedure
1058	00-11-26 10:11:15	pnkm(A)	(2)14-12-”30”	Station name
1059	00-11-26 10:11:35	pnkm(A)	(2)14-12-”31”	Station name
1060	00-11-26 10:12:15	pnkm(A)	(3)A0-2	Logout procedure
1061	00-11-27 11:20:30	rev(R)	(3)A0-1	Login procedure

The sample printout (without consideration of headers and footers) refers to the following information concerning administration procedures:

- The Revisor (“rev” user in “R” (Revision) user group) has generated an initial archive.
- The Service (“serv” user in “S” (system maintenance) user group) has read out the system database, changed 20 station names, and written them again to the system.
- The Customer (“pnkm” user in “A” (Administration) user group) has changed two additional station names.
- The Revisor has retrieved the most recent log entries and printed them out.

6 Middleware

6.1 HiPath TAPI 120 V2.0

The 1st party CTI functionality is available for all HiPath 3000 models in conjunction with HG 1500. Up to six TAPI 120 can be operated without a license. Licenses are mandatory for any additional TAPI 120s installed. The software, installation manual and additional information (data sheet) can be found on the Internet at http://www.siemens.de/hipath.

6.1.1 HiPath TAPI 170 V2.0

This TAPI driver supports Microsoft TAPI 2.1 (Windows NT 4.0) and TAPI 3.0 (Windows 2000/ XP). The software is enabled by a license server. Test software, installation manual and additional information (data sheet) can be found on the Internet at http://www.siemens.de/hipath.

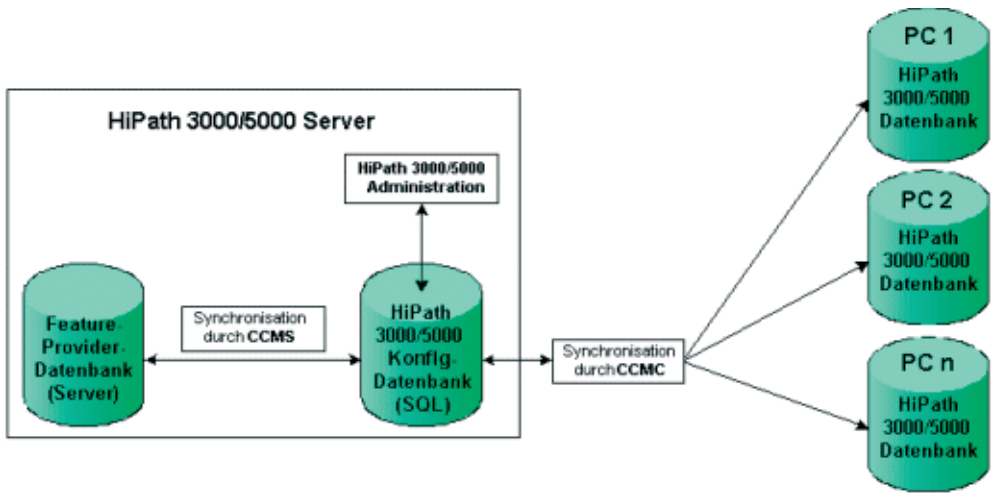
server	**Operating systems**	**Windows NT 4.0 (SP 6 or higher) or Windows 2000**
Clients	Operating systems	Windows 98, Windows NT 4.0 (SP 6 or higher), Windows 2000 or Windows XP Professional
	Connection variants	V.24, S0 or LAN
	Basic software package	10 clients, 4 expansion packages up to 10, 25, 50 and 100 clients
CSTA	CSTA Interfaces	Depending on the model, up to four interfaces are available
	Applications	Several applications can run in parallel, but they cannot send conflicting commands or be mutually exclusive
	Monitor points	1000 Four monitor points are required, for example, to monitor a station with four applications over CSTA
	Call number length	Maximum of 6 digits
	Load behavior	incoming calls are rejected (busy) as soon as a traffic volume of 1400 BHCA is exceeded. This happens when more than four calls are received within ten seconds. This does not affect call traffic within the node

server	Operating systems	Windows NT 4.0 (SP 6 or higher) or Windows 2000
	CallCenter operation	If, as a customer of Siemens AG, you want to operate a call center with more than 32 agents at the CSTA interface, contact your country-specific Siemens organization to inspect additional configurations. For direct sales, please use the planning tool to inspect the dynamic performance limit of a HiPath 37x0 configuration.

6.1.2 Data Synchronization

Data Synchronization

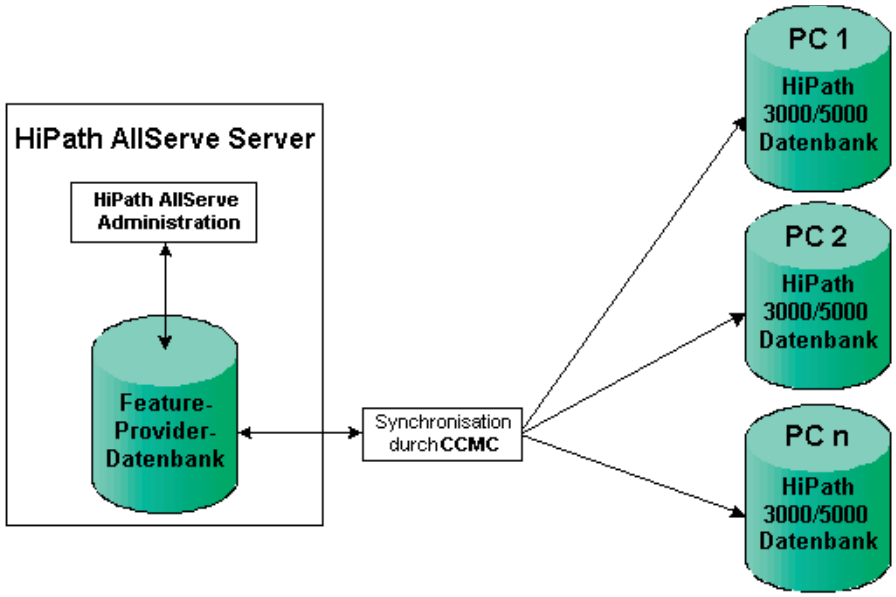
When using *TAPI 170* in the networked system, synchronization of the configuration data is carried out via the CCMS/CCMC components:



- Synchronization of the configuration data between the feature provider database and the central HiPath 3000/5000 database (SQL) is administered via the CCMS (Central Configuration Manager Server) on the HiPath 3000/5000 server.
- The central administration tool updates the client configuration data in the central HiPath 3000/5000 database (SQL).
- Synchronization of the configuration data between the HiPath 3000/5000 database (SQL) and the local HiPath 3000/5000 databases (mdb) is administered via the CCMC (Central Configuration Manager Client) on the respective PCs.

Data Synchronization (HiPath AllServe)

When using *TAPI 170* in the HiPath AllServe network, the configuration data is synchronized via the CCMS/CCMC components:



- The central administration tool updates the client configuration data in the central HiPath 3000/5000 database (SQL).
- The configuration data in the HiPath 3000/5000 database (SQL) and the local HiPath 3000/5000 databases (mdb) is synchronized via the CCMC (Central Configuration Manager Client) on the respective PCs.

6.1.3 Features

The following features are available depending on the system used and the support of the TAPI applications:

Features of the Components TSP/CMD

- Outgoing connection setup, incoming call acceptance, ending calls
- Call status display, call number display
- Call logging
- Call pick-up (group), consultation hold, toggle, call transfer, conference
- Speed transfer, redirect and call hold
- Touchtone dialing (DTMF) during conversation
- Call detail information
- Description of display
- Hookswitch status setting/retrieval
- Volume control for handset, speaker and headset
- Set LED mode
- Park/unpark
- Dynamic generation of lines via the application
- Call center features
  - Retrieve/set/delete mailbox indicator (message waiting)
  - Retrieve/set/delete call forwarding/do not disturb
  - Additional information for forwarded/ redirected/switched calls
  - Playing Music On Hold and recorded announcements (RCA)
  - Trunk and UCD monitoring
  - Call detail recording (with respect to call status)
  - Unique call identification (in the general domain)
  - Call data exchange between TAPI applications (in the general domain)

TSP (TAPI Extended Services) Features

- Central recording of call charges
- Support of ACD proxy request handler
- Telephone Data Service (TDS)
- Heartbeat/loopback
- AMHOST

6.1.4 System Connection Hardware

TAPI 170 for *HiPath 3000/5000* or in the *HiPath* Network

The CTI components are usually connected to one another or to the system(s) via TCP/IP.

TAPI 170 as a Standalone Solution

Alternatively, the TSP/CMD components can be connected to one another or to the system as follows:

- via the DIVA Pro 2.0. ISDN card supplied
- via a V24 interface with a null modem cable (part number: C39195-Z7267-C13); in order to achieve the best performance possible, the baud rate used can be increased to 19200 bauds.
- via TCP/IP (recommended default).

6.1.5 Software and Hardware Requirements

Hardware Requirements for Server and Client PCs

The hardware requirements valid here are those specified in Microsoft's PC documentation for Windows NT 4.0 or Windows 2000. For more information see the Windows documentation.

Software Requirements for the Server PC

- Windows NT Server 4.0 Service Pack 4 and later
- **or** Windows 2000 Server
- **or** Windows 2000 Advanced Server

When using *TAPI 170* for *HiPath 3000/5000* network, the server PC will normally only operate under Windows 2000.

Software Requirements for Client PCs

- Windows 98
- **or** Windows ME
- **or** Windows NT Server 4.0 Service Pack 4 and later
- **or** Windows NT Workstation 4.0 Service Pack 4 and later
- **or** Windows 2000 Server
- **or** Windows 2000 Advanced Server
- **or** Windows 2000 Professional
- **or** Windows XP Office

The Windows NT Service Pack can be downloaded in the Internet at:

> http://www.microsoft.com/downloads/

Other Requirements

- **Network protocol:** TCP/IP must be configured.
- The server PC and the client PC must belong to a Windows NT or Windows 2000 domain.
- When using Windows NT4 (to read the MAC ID), NETBIOS must be activated.

6.1.6 Installation Medium and Order of Installation

Depending on the *TAPI 170* system variant, the following applies:

Installation of *TAPI 170* for *HiPath 3000/5000* or *HiPath 5000*

The installation files for *TAPI 170* are included in the installation media for *HiPath 5000* or *HiPath 3000/5000* software installation.

The order in which the components are installed is automatically selected by the installation program. The components to be installed can be specified during installation. After installing the components, the necessary parameters may be individually configured before carrying out further installations. However, the components can also be configured at a later time.

Installation of *TAPI 170* (Standalone)

An installation CD with the title

HiPath TAPI 170 V2.0

is included. Since the installation comprises components from various manufacturers, it is essential that the installation is performed in the following order.

Order of Installation

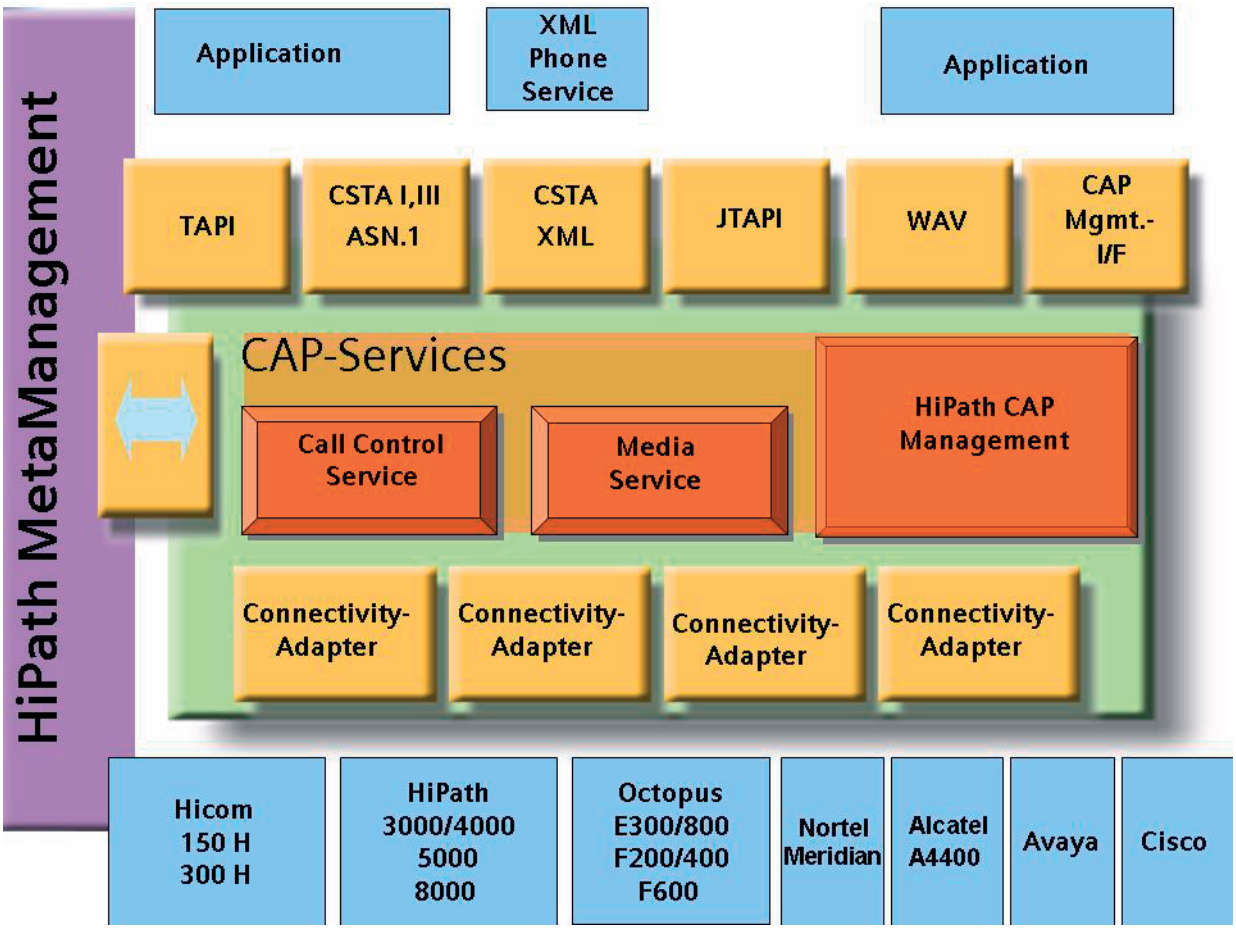
1. Component installation
2. Component configuration

6.2 HiPath CAP 3.0

HiPath CAP is a powerful middleware solution with modular scalability. It delivers efficient improvements and promotes cost reduction by:

- supporting standard APIs for application developers,
- supporting application developments with services for CTI, management, and licensing, available over an SDK,
- supporting migration from Hicom 300 E/H to HiPath 4000 with multifaceted connection to various communication platforms, making an application virtually independent of the underlying infrastructure.

The following diagram shows the basic structure of HiPath CAP with detailed information on the protocols supported and the encryption variants, the CAP-specific services and a number of telecommunication systems supported.



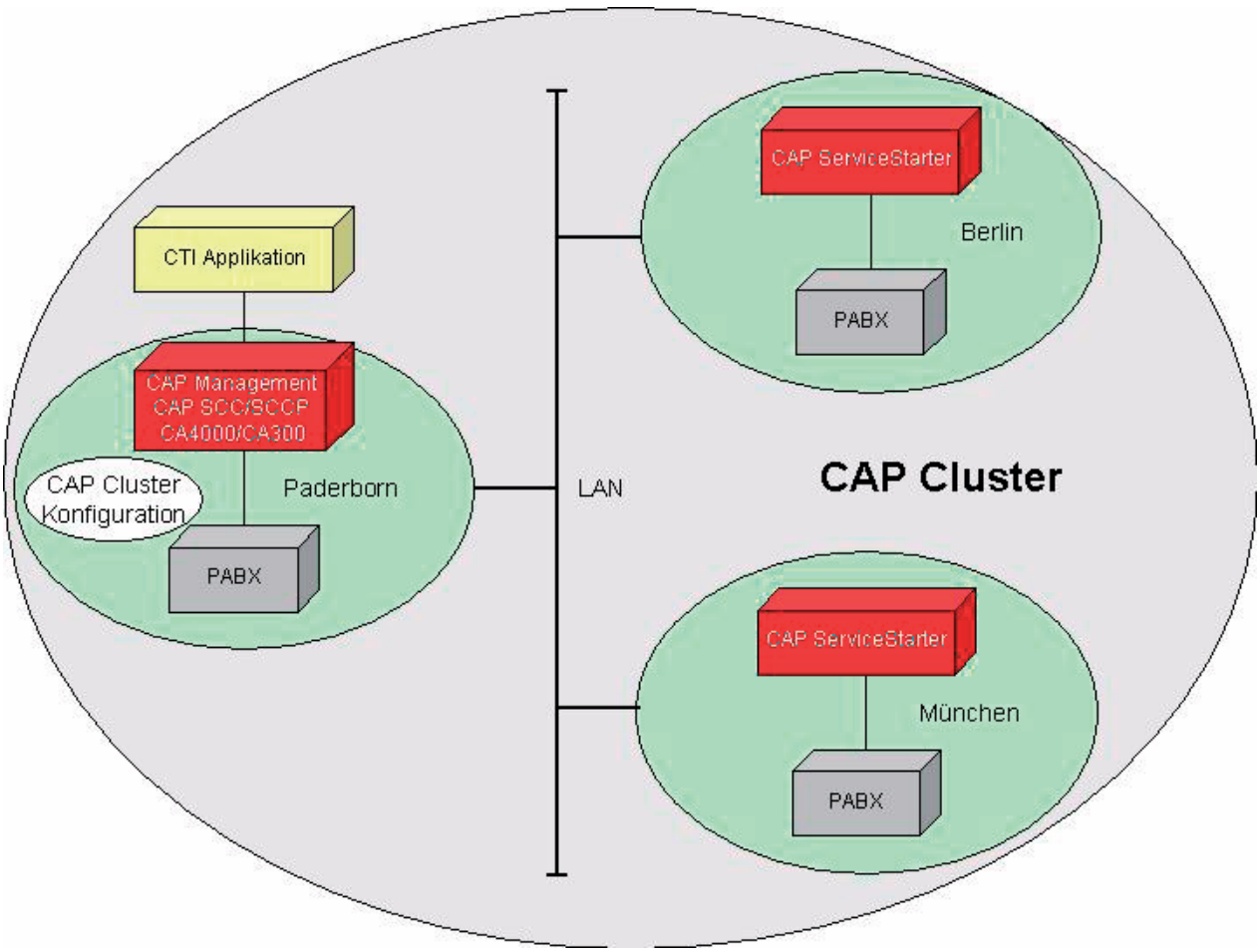
Highlights

- Standard protocols and APIs: Microsoft TAPI 2.x/3.0, JTAPI, CSTA III ASN.1, CSTA XML, Microsoft Wave API
- Call Control Service (SCC) for CTI
  - multi-domain features
  - harmonization of the call models for Hicom 300 H, HiPath 3000, HiPath 4000, HiPath 5000, HiPath 8000, Octopus E300/800 Rel. 6.5/10, Realitis, Alcatel, Nortel Meridian, Cisco, and Avaya - for TAPI- and CSTA-based applications
- Media Service (MEB) for CTI
  - Media streaming as a new HiPath CAP feature for applications
- Fault Management Service
  - Integration in HiPath Management (not dependent on CAP Management)
- License, User, and Configuration Management Services
  - uniform license structure
  - integrated License and User Management tool
  - connection to the HiPath License Server (CLS)
  - feature as a service for licensing HiPath CAP and applications in the same manner
- Support for special features
  - LiRus, AP emergency, XML PhoneServices

6.3 HiPath CAP Management

CAP Management is the central component in a CAP cluster. It manages and controls all processes and services in a local or distributed HiPath CAP installation. The cluster ID is a unique form of identification for CAP components in the same CAP cluster.

The following diagram illustrates the position and configuration of the individual CAP components in a distributed installation.



CAP Management is started via the Windows service **Siemens HiPath CTI** and features a Web-based interface for administration.

CAP Management tasks

- Administration of central and distributed components
- Administration of users
- Administration of devices
- Administration of licenses
- License inspection and access control for users and devices
- Administration of status information for the various processes and services

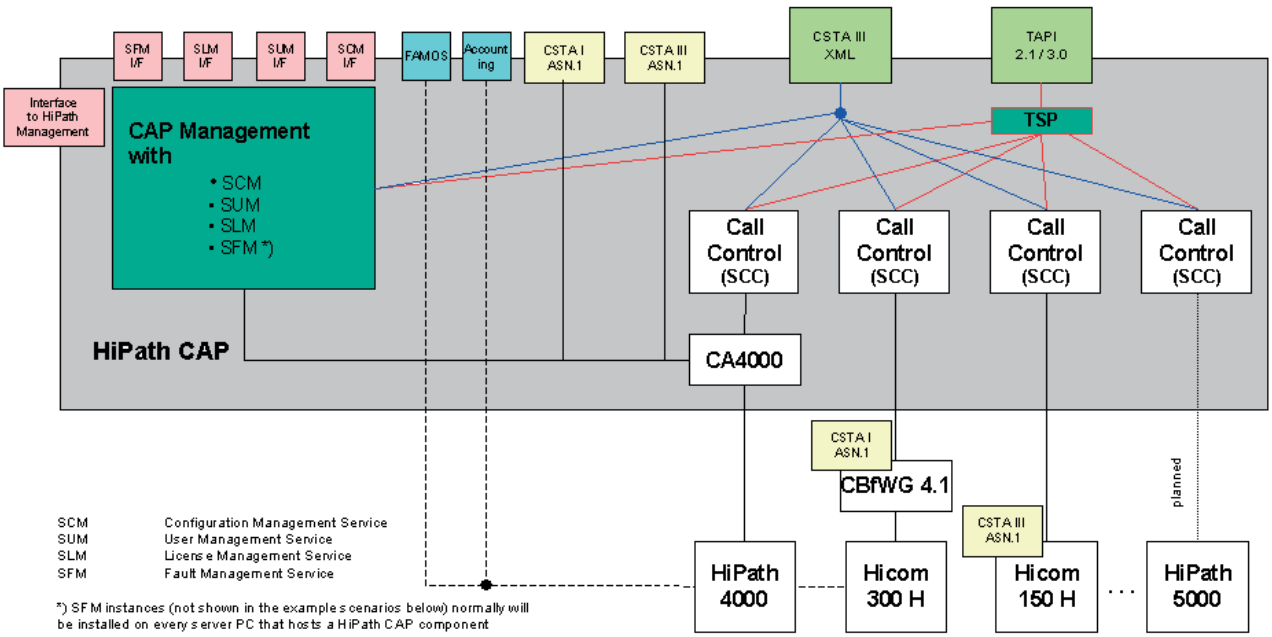
HiPath CAP Management services

CAP Management can be split into different services that have different tasks:

- Configuration Management (SCM)
- User Management (SUM)
- License Management (SLM)
- CallIdRepository
- Address Translation Service (SAT)
- Open LDAP Server
- Fault Management (SFM) (independent of CAP Management)

6.3.1 HiPath CAP Client/Server Architecture

The HiPath CAP system is based on a client/server architecture. This architecture allows third party CTI solutions to be implemented. CAP Call Control Service enables the connection to the telecommunication system and provides application interfaces both on the CTI server and on the CTI terminals.



The architecture consists of three components:

- Telecommunication system
- CSTA-based CTI server
- Microsoft TAPI-based CTI client

The telecommunication systems supported by the HiPath CAP system differ in particular in the scope of the telephony functions available via CSTA and the type of physical connection between the telecommunication system and the CTI server.

The HiPath CAP system itself consists of the CAP Management server component, CAP Call Control Service and the CAP TAPI Service Provider client component. There is a separate installation procedure for each component.

Several telecommunication systems can be controlled collectively by CAP Call Control Services (one service per telecommunication system).

CAP Call Control Service runs in conjunction with CAP Management, which facilitates the administration of the individual servers. In addition, all telephone numbers are protected with a password via CAP Management.

CAP Call Control Service runs in conjunction with CAP Management, which facilitates the administration of the individual servers. In addition, all telephone numbers are protected with a password via CAP Management.

Connections are established between Version 6.0 and CAP Call Control Service indirectly via CAP Management. CAP Management is responsible for authentication (by means of a password) and the determination of the CAP Call Control Server responsible for a line. This means that reconfigurations on the part of the telecommunication systems are transparent for the Version 6.0 and the client applications on the basis of this service provider.

For example, if telephone numbers are moved from once telecommunication system to another, and become the responsibility of a different CAP Call Control server (with a different IP address/port number), then the relevant configuration can only be implemented via CAP Management.
Conversely, there is no need to configure client applications in the HiPath CAP system. This means that the IP addresses of clients can change, for example through dynamic assignment via DHCP. The client and CAP Call Control Service are dynamically assigned via CAP Management at every login.

Further information about CAP can be found in the relevant manuals:
- HiPath CAP 3.0, Installation and Administration Manual
- HiPath CAP 3.0, CAP TAPI Service Provider, Installation and Administration Manual

6.4 CAP TAPI Service Provider

HiPath CAP is a software platform for Computer Telephony Integration (CTI) on telecommunication systems. Version 6.0 links the CTI client applications. Version 6.0 supports all telecommunication systems accessible over HiPath CAP.

The HiPath CAP system uses interfaces to supply the telecommunication system functionality that can be used in random CTI applications.

7 Workpoints

7.1 optiClient 130 V5.0

The optiClient 130 V5.0 is a PC-based multimedia application that offers connection services for different communication media over a LAN (network). Voice, video, or chat connections can be managed and controlled using the optiClient 130 V5.0. For voice connections, this means that the optiClient 130 V5.0 can be used on a PC like a telephone.

Modular structure

The optiClient 130 V5.0 has a modular structure for the functional elements which can be extended or replaced to change the scope of functions available.

- The basic module of the optiClient 130 V5.0 is the main bar. The main bar does not provide any communication functions itself, but instead serves as a central component that works together with the various modules to define the communication functions and display of the optiClient 130 V5.0.
- Interface modules are the modules that allow the available functions to be operated in windows and dialogs. Examples of interface modules are: telephone windows, directories, call list management, etc.
- Provider modules determine which communication systems or communication service providers the optiClient 130 V5.0 can be connected to.
- Manager modules run in the background and are not visible. They assume general communication control functions. Examples of manager modules include the Keyboard Manager and ScreenSaver Manager.

Requirements for the PC

- Windows 2000 (SP4 or higher) or Windows XP operating system (SP 1)
- Processor: recommended from 1 GHz
- RAM memory: at least 512 MB

Documentation

German and English documentation is available for optiClient V5 Step 2.

Other languages - French, Italian, Spanish, Portuguese, Dutch documentation – at present only available for optiClient V5 Step 1.

New Features

- Support for HiPath 3000
- Contact list/ personal internal phonebook
- Contact list
- Web browser
- easyCom module
- Migration tool (V2.5/V4.0 è V5.0 Step 2)
- Small Remote Site Redundancy

7.1.1 optiClient S V2.0

optiClient 130 S V2.0 is the PC client for SIP-protocol-based telephony and videoconferencing on the real-time IP system HiPath 8000 and on Cisco Proxy.

optiClient 130 S V2.0 is the latest PC client from the Siemens client family. It delivers a PC-based VoIP solution as well as videoconferencing with three stations.

As a member of the optiClient family, optiClient 130 S V2.0 offers the same look and feel as optiClient 130 V5.0. And as it supports the SIP protocol, only minor adjustments are required for operation with other SIP-based systems.

The optiClient 130 S V2.0 architecture features modular functional elements that guarantee maximum flexibility and alignment with user requirements. These elements include:

- **Main bar** – The main bar acts as a central element which, together with the modules listed below, determines the functions available and the display mode for the users.
- **User interface modules** – These are used for operating the various functions available in windows and dialogs, including the phone module for telephony features, Audio Manager for operating audio telephones, call lists, and address books.
- **Provider modules** – You can enter the communication system or service provider that the optiClient 130 connects to here.
- **Manager modules** – These work invisibly in the background and perform general communication control functions. Manager modules include the Keyboard Manager and Screen-Saver Manager

- **Video modules** – These modules display the actual video image and the external partner or both conference partners.

7.1.1.1 User Interface

The optiClient 130 user interface consists of a main bar (system bar) that features a range of associated dialogs for selecting the individual functions and settings and for identifying ringing state.

User interface features:

- The optiClient main bar can be positioned anywhere on the desktop.
- Open windows can be dragged from the main bar and positioned anywhere on the screen.

Extended keypad

This option lets the user add programmable keys to the keypad. The number of columns, the number of function keys per column, and the default

function key programming depend both on the preferred settings and the HiPath provider connected.

The application's individual modules can be dragged from the main bar and positioned anywhere on the screen. For example, frequently used functions, such as, speed dialing keys, can be anchored anywhere on the screen.

Also provided for optiClient 130 S V2.0 is the easyCom module that is based on a simple and intuitive principle. The actual subscriber appears in the "communication circle" and communicates with his or her environment by dragging other parties to the communication circle.

- New and modern user interface designed to meet the needs of the user
- Enhanced telephony functions, such as, the extended keypad
- Ideal solution for mobile workers – no matter where he or she is, the user always keeps the same internal number
- Individual access privileges and other parameters are maintained, for example, initiated call forwarding, do not disturb

TAPI support: TAPI 2.0 (first party TAPI) driver for dialing from standard TAPI PC applications

PC requirements

- Operating system: Windows 2000 (SP4 or higher) or Windows XP (SP1 or higher). Please make sure you always use the latest operating system software release.
- Processor: 1 GHz or more recommended

- RAM memory: 512 MB or more recommended
- At least 150 MB of free space on the hard disk
- CD-ROM drive
- Ethernet network card

Network requirement/QoS

- for the Quality of Service (QoS) function with 802.1p support
- USB support for connecting the optiPoint handset as an audio device

7.2 optiPoint 410 and optiPoint 420 product family

The IP telephones in the optiPoint 410 and optiPoint 420 families allow users to conduct telephone calls in the simple, familiar way over a data network.

All HiPath 3000/HiPath 5000 features that are offered in the display dialog, in the service menu, and on function keys are available (except for Relocate).

The three dialog keys and the display guarantee convenient and interactive operation (not available for optiPoint 410 entry). Furthermore, the key lamp principle visualizes the activated functions.

The difference between the optiPoint 410 and optiPoint 420 families lies in the design of the function key panels:

- optiPoint 410 family: the function keys have panels with labeling strips on which the function or call number currently saved can be entered.
- optiPoint 420 family: the function keys are self-labeling keys. Self-labeling means that each key is assigned a display (1 line with 12 characters) in which the function or call number currently saved is shown.

The optiPoint SLK add-on device allows you to increase the number of function keys available (not applicable for optiPoint 410 entry, optiPoint 410 economy, optiPoint 420 economy and optiPoint 420 economy plus). The add-on devices optiPoint key module and optiPoint BLF can be used with the optiPoint 410 and optiPoint 420 families.

The optiPoint 410 display module is used as an add-on device for optiPoint 410 standard, optiPoint 410 advance, optiPoint 420 standard and optiPoint 420 advance. Its graphical LCD display (320 x 240 dots), the touchscreen and the navigation keys mean that many functions can be used intuitively and therefore more effectively.

The use of different optiPoint 500 adapters guarantees flexibility for the expansion of the telephone workstation (not optiPoint410 entry, optiPoint 410 economy, optiPoint 420 economy and optiPoint 420 economy plus).

7.2.1 optiPoint 410 Telephones

7.2.1.1 optiPoint 410 entry

Main Features

- Protocols
  - H.323, HFA/V3 + V4, CorNet IP
  - HTTP, DHCP, SNMP, FTP
  - H.235 (security)
  - QoS to DIFFSERV and IEEE 802.1 p/Q
- Voice compression G.711, G.722, G.723 and G.729 A/B
- Power over LAN (in accordance with Cisco and standard pre802.3af)
- CTI (for example, via TAPI 3rd party)
- 1 Ethernet (10/100BaseT) interface (self-configuring) for LAN connection
- 8 function keys (can be modified with HiPath 3000 Manager E) with LEDs
- 2 volume adjustment keys (plus/minus) and pitch
- Suitable for wall mounting
- no modularity (no connecting capability for adapters or add-on devices), no display

Standard key assignment (default) for optiPoint 410 entry

Consultation hold
Number redial
Message
Callback
Speed dialing
Microphone on/off
Loudspeaker
Disconnect

Figure 7-1 optiPoint 410 entry - Standard Key Assignment (Default)

7.2.1.2 optiPoint 410 economy

Main Features

- Protocols
  - H.323, HFA/V3 + V4, CorNet IP
  - HTTP, DHCP, SNMP, FTP
  - H.235 (security)
  - QoS to DIFFSERV and IEEE 802.1 p/Q
- Voice compression G.711, G.722, G.723 and G.729 A/B
- Power over LAN (in accordance with Cisco and standard pre802.3af)
- CTI (for example, via TAPI 3rd party)
- 1 Ethernet (10/100BaseT) interface (self-configuring) for LAN connection
- 12 function keys with LEDs (4 that can be programmed with HiPath 3000 Manager E, 8 freely programmable)
- Alphanumeric LCD swivel display with 2 lines, 24 characters each
- Three dialog keys for interactive prompting “Yes”, “Back”, and “Next”
- Open listening
- 2 volume adjustment keys (plus/minus), pitch and display contrast
- Suitable for wall mounting
- No modularity (no connecting capability for adapters or add-on devices)

Standard key assignment (default) for optiPoint 410 economy

Service	Programmable
Number redial	Programmable
Microphone on/off	Programmable
Loudspeaker	Programmable
	Programmable
	Programmable
	Programmable
	Disconnect

Figure 7-2 optiPoint 410 economy - Standard Key Assignment (Default)

7.2.1.3 optiPoint 410 standard

Main Features

- Protocols
  - H.323, HFA/V3 + V4, CorNet IP, SIP
  - HTTP, DHCP, SNMP, FTP
  - H.235 (security)
  - QoS to DIFFSERV and IEEE 802.1 p/Q
- Voice compression G.711, G.722, G.723 and G.729 A/B
- Power over LAN (in accordance with Cisco and standard pre802.3af)
- CTI (for example, via TAPI 1st Party)
- 1 Ethernet (10/100BaseT) interface (self-configuring) for LAN connection
- 1 Ethernet (10/100BaseT) interface (self-configuring) for the PC connection
- 12 function keys with LEDs (4 that can be programmed with HiPath 3000 Manager E, 8 freely programmable)
- Alphanumeric LCD swivel display with 2 lines, 24 characters each
- Three dialog keys for interactive prompting “Yes”, “Back”, and “Next”
- Full duplex speakerphone mode with echo suppression for adapting to the room
- Port for headset (121 TR 9-5)
- 2 volume adjustment keys (plus/minus), pitch, speaker quality and display contrast
- Modularity:
  - 2 adapter slots (option bays)
  - 1 interface for max. 2 add-on devices
- Suitable for wall mounting

Standard key assignment (default) for optiPoint 410 standard

Service	Programmable
Number redial	Programmable
Microphone on/off	Programmable
Loudspeaker	Programmable
	Programmable
	Programmable
	Programmable
	Disconnect

Figure 7-3 optiPoint 410 standard - Standard Key Assignment (Default)

7.2.1.4 optiPoint 410 advance

Main Features

- Protocols
  - H.323, HFA/V3 + V4, CorNet IP, SIP
  - HTTP, DHCP, SNMP, FTP
  - H.235 (security)
  - QoS to DIFFSERV and IEEE 802.1 p/Q
- Voice compression G.711, G.722, G.723 and G.729 A/B
- Power over LAN (in accordance with Cisco and standard pre802.3af)
- CTI (for example, via TAPI 1st Party)
- 1 Ethernet (10/100BaseT) interface (self-configuring) for LAN connection
- 1 Ethernet (10/100BaseT) interface (self-configuring) for the PC connection
- 1 integrated USB 1.1 interface
- 19 function keys with LEDs (4 that can be programmed with HiPath 3000 Manager E, 15 freely programmable)
- Graphic display (swivel) with 4 lines, 24 characters each
- Three dialog keys for interactive prompting “Yes”, “Back”, and “Next”
- Full duplex speakerphone mode with echo suppression for adapting to the room
- Port for headset (121 TR 9-5)
- 2 volume adjustment keys (plus/minus), pitch, speaker quality and display contrast
- Modularity:
  - 1 adapter slot (option bay)
  - 1 interface for max. 2 add-on devices
- Suitable for wall mounting

Standard key assignment (default) for optiPoint 410 advance

Service	Programmable
Number redial	Programmable
Microphone on/off	Programmable
Loudspeaker	Programmable
	Programmable
	Programmable
	Programmable
	Programmable
	Programmable
	Programmable
	Programmable
	Programmable
	Programmable
	Programmable
	Programmable

Figure 7-4 optiPoint 410 advance - Standard Key Assignment (Default)

7.2.2 optiPoint 420 Telephones

The IP telephones of the optiPoint 420 family feature self-labeling keys. Self-labeling means that each key is assigned a display (1 line with 12 characters) where the currently-stored function or station number is shown.

7.2.2.1 optiPoint 420 economy

Main Features

- Protocols
  - H.323, HFA/V3 + V4, CorNet IP, SIP
  - HTTP, DHCP, SNMP, FTP
  - H.235 (security)
  - QoS to DIFFSERV and IEEE 802.1 p/Q
- Voice compression G.711, G.722, G.723 and G.729 A/B
- Power over LAN (in accordance with Cisco and standard pre802.3af)
- CTI (for example, via TAPI 1st Party)
- 1 Ethernet (10/100BaseT) interface (self-configuring) for LAN connection
- 12 function keys (5 changeable using HiPath 3000 Manager E, 7 user-programmable) with LEDs and self-labeling keys
- Graphic display (swivel) with 2 lines, 24 characters each
- Three dialog keys for interactive prompting “Yes”, “Back”, and “Next”
- Open listening
- 2 volume adjustment keys (plus/minus), pitch and display contrast
- Suitable for wall mounting
- No modularity (no connecting capability for adapters or add-on devices)

Standard key assignment (default) for optiPoint 420 economy

Service	Programmable
Number redial	Programmable
Mailbox	Programmable
Microphone on/off	Programmable
Loudspeaker	Programmable
	Programmable
	Programmable
	Disconnect

Figure 7-5 optiPoint 420 economy - Standard Key Assignment (Default)

7.2.2.2 optiPoint 420 economy plus

Main Features

- Protocols
  - H.323, HFA/V3 + V4, CorNet IP, SIP
  - HTTP, DHCP, SNMP, FTP
  - H.235 (security)
  - QoS to DIFFSERV and IEEE 802.1 p/Q
- Voice compression G.711, G.722, G.723 and G.729 A/B
- Power over LAN (in accordance with Cisco and standard pre802.3af)
- CTI (for example, via TAPI 1st Party)
- 1 Ethernet (10/100BaseT) interface (self-configuring) for LAN connection
- 1 Ethernet (10/100BaseT) interface (self-configuring) for the PC connection
- 12 function keys (5 changeable using HiPath 3000 Manager E, 7 user-programmable) with LEDs and self-labeling keys
- Graphic display (swivel) with 2 lines, 24 characters each
- Three dialog keys for interactive prompting “Yes”, “Back”, and “Next”
- Open listening
- Port for headset (121 TR 9-5)
- 2 volume adjustment keys (plus/minus), pitch and display contrast
- Suitable for wall mounting
- No modularity (no connecting capability for adapters or add-on devices)

Standard key assignment (default) for optiPoint 420 economy plus

Service	Programmable
Number redial	Programmable
Mailbox	Programmable
Microphone on/off	Programmable
Loudspeaker	Programmable
	Programmable
	Programmable
	Disconnect

Figure 7-6 optiPoint 420 economy - Standard Key Assignment (Default)

7.2.2.3 optiPoint 420 standard

Main Features

- Protocols
  - H.323, HFA/V3 + V4, CorNet IP, SIP
  - HTTP, DHCP, SNMP, FTP
  - H.235 (security)
  - QoS to DIFFSERV and IEEE 802.1 p/Q
- Voice compression G.711, G.722, G.723 and G.729 A/B
- Power over LAN (in accordance with Cisco and standard pre802.3af)
- CTI (for example, via TAPI 1st Party)
- 1 Ethernet (10/100BaseT) interface (self-configuring) for LAN connection
- 1 Ethernet (10/100BaseT) interface (self-configuring) for the PC connection
- 12 function keys (5 changeable using HiPath 3000 Manager E, 7 user-programmable) with LEDs and self-labeling keys
- Graphic display (swivel) with 2 lines, 24 characters each
- Three dialog keys for interactive prompting “Yes”, “Back”, and “Next”
- Full duplex speakerphone mode with echo suppression for adapting to the room
- Port for headset (121 TR 9-5)
- 2 volume adjustment keys (plus/minus), pitch, speaker quality and display contrast
- Modularity:
  - 2 adapter slots (option bays)
  - 1 interface for max. 2 add-on devices
- Suitable for wall mounting

Standard key assignment (default) for optiPoint 420 standard

Service	Programmable
Number redial	Programmable
Mailbox	Programmable
Microphone on/off	Programmable
Loudspeaker	Programmable
	Programmable
	Programmable
	Disconnect

Figure 7-7 optiPoint 420 standard - Standard Key Assignment (Default)

7.2.2.4 optiPoint 420 advance

Main Features

- Protocols
  - H.323, HFA/V3 + V4, CorNet IP, SIP
  - HTTP, DHCP, SNMP, FTP
  - H.235 (security)
  - QoS to DIFFSERV and IEEE 802.1 p/Q
- Voice compression G.711, G.722, G.723 and G.729 A/B
- Power over LAN (in accordance with Cisco and standard pre802.3af)
- CTI (for example, via TAPI 1st Party)
- 1 Ethernet (10/100BaseT) interface (self-configuring) for LAN connection
- 1 Ethernet (10/100BaseT) interface (self-configuring) for the PC connection
- 1 integrated USB 1.1 interface
- 18 function keys (5 changeable using HiPath 3000 Manager E, 13 user-programmable) with LEDs and self-labeling keys
- Graphic display (swivel) with 4 lines, 24 characters each
- Three dialog keys for interactive prompting “Yes”, “Back”, and “Next”
- Full duplex speakerphone mode with echo suppression for adapting to the room
- Port for headset (121 TR 9-5)
- 2 volume adjustment keys (plus/minus), pitch, speaker quality and display contrast
- Modularity:
  - 1 adapter slot (option bay)
  - 1 interface for max. 2 add-on devices
- Suitable for wall mounting

Standard key assignment (default) for optiPoint 420 advance

Service	Programmable
Number redial	Programmable
Mailbox	Programmable
Microphone on/off	Programmable
Loudspeaker	Programmable
	Programmable
	Programmable
	Programmable
	Programmable
	Programmable
	Programmable
	Programmable
	Programmable
	Programmable
	Programmable

Figure 7-8 optiPoint 420 advance - Standard Key Assignment (Default)

7.2.3 optiPoint 410 advance S and optiPoint 420 advance S

optiPoint 410 and 420 advance S V4.0 are top-of-the-range models from the optiPoint 410 and 420 families and the first IP phones to offer full SIP protocol support.

optiPoint modules are implemented to guarantee alignment with your workplace requirements.

Applications, such as, Electronic Notebook, WAP Browser or LDAP address finder can be used in conjunction with the optiPoint display module.

optiPoint 410 advance

optiPoint 410 advance is the optiPoint 410 family's top-of-the-range model and, like the other models in the latest series of Siemens IP telephones, not only offers a wide range of features for IP-based telephony, but also permits the modular expansion of these features, where necessary, through the addition of optiPoint modules and optiPoint adapters (depending in some cases on the software version).

Features common to optiPoint 410 and optiPoint 420 models range from the numerous codecs supported including the new broadband codec G.722 to QoS mechanisms and standard-specific Power-over-LAN. These models also offer flexible administration and maintenance options as well as opportunities for using additional features and new applications after downloading the appropriate software.

The optiPoint 410 advance model offers a range of special hardware features:

- Modular configuration (optiPoint key module, optiPoint key module SLK, optiPoint display module, optiPoint adapter).
- Large, illuminated four-line display.
- Interfaces for headset, USB port.
- Speakerphone in full-duplex mode.

- Additional functions are available through enhancement with the optiPoint display module (including graphical user prompts, voice dialing, notebook).

optiPoint 420 advance

In addition to the features already mentioned, optiPoint 420 advance offers even greater user-friendliness: "self-labeling key" technology provides an LCD representation of function key programming – and makes it easy to ensure that the display is always up to date.

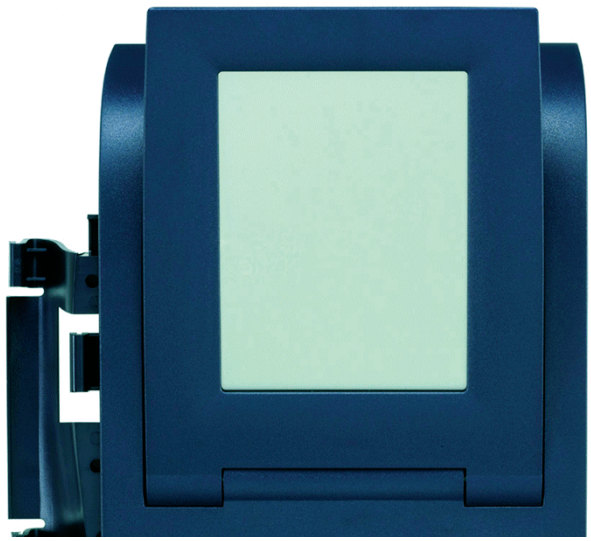
Overview of advantages

- optiPoint 410 and 420 advance S V4.0 are versatile and high-performance IP phones that use both SIP standards and SIP-based features from the Siemens real-time communication system, HiPath 8000.
- Support for optiPoint key module and optiPoint display module.
- Integrated 10/100-Mbps mini switch – only one cable to the workstation for telephone and PC.
- Best voice quality for VoIP thanks to versatile codes, QoS mechanisms, and full-duplex speakerphone equipment.
- Numerous applications on the optiPoint display module to improve telephone integration in workflows: LDAP access to directories, Electronic Notebook, access to network data with WAP Browser.

List of features

- Backlit, pivoting, four-line graphical LCD display with 24 characters per line
- Eighteen/nineteen programmable function keys with LEDs.
- Three dialog keys for user prompting
- Two control keys (plus/minus) for volume/pitch adjustment
- Loudspeaker and microphone integrated for full-duplex speakerphone mode.
- Built-in port for headset connection.
- Integrated, configurable 10/100-Mbps mini switch for connecting the telephone and PC over a shared LAN connection.
- Connection of up to two optiPoint key modules or (alternatively) up to two optiPoint self-labeling key modules. Sixteen or 13 additional keys are available in each module and can be programmed on two levels.

Use of applications over the optiPoint display module



- Graphic display with 240 (320) pixels with touchscreen functionality, backlit and pivoting.
- Five navigation/control keys
- "Electronic Notebook (ENB)" application
- Stores up to 640 entries with contact information, such as, names and telephone numbers, to simplify dialing.
- "WAP Browser" application
  – Access to Internet and intranet content in WML format over WAP gateway or proxy server.
  – Online telephone help can be accessed via WAP Browser.
- "LDAP" application
  – Online address databases can be accessed rapidly over the LDAP interface and data entered at a central location can be conveniently used to set up connections.
- Java applications
  – The integrated Java™ Virtual Machine can be used to implement Java applications on the optiPoint display module.
  – For example, the speed-dial application supplied which can be used to program and dial the 40 speed-dial destinations over a graphical user interface.
  – In addition, customer-specific applications can be created in general as a free Java SDK is also provided for the telephone.

7.2.4 optiPoint 410 and optiPoint 420 Add-On Devices

Caution
Always disconnect the line cord before connecting add-on devices to the telephone.

The user usually installs the add-on devices. The installation instructions are on the “Electronic Operating Instructions” CD.

A maximum of two add-on devices may be installed on an optiPoint 410 or optiPoint 420 telephone (not optiPoint 410 entry, optiPoint 410 economy optiPoint 420 economy and optiPoint 420 economy plus).
optiPoint key module and optiPoint BLF can be used in addition to the two add-on devices described below. Table 7-1 shows the possible add-on device configurations.

7.2.4.1 optiPoint SLK module

The optiPoint SLK module is an add-on device that should be mounted on the side of the telephone; it provides an additional 13 keys, LEDs, and displays for all purposes. SLK (self-labeling key) means that each key is assigned a display (1 line with 12 characters) in which the function or call number currently saved is shown.

Figure 7-9 optiPoint SLK module

Double assignment can be performed for the keys if only call numbers without LED support are saved on the first level. It is also possible to program call numbers without LED support on the second level. These can be internal station numbers, DID call numbers and call numbers from a HiPath network.

The bottom key of the first key module installed on the telephone (optiPoint SLK module or optiPoint key module) is automatically defined as “Shift key” (default). A Shift key must not already be programmed.

7.2.4.2 optiPoint 410 display module

This is an add-on device with a graphic swivel display (240 x 320 pixels) with touchscreen functionality, background illumination, and navigation keys.

Figure 7-10 optiPoint 410 display module

Main Features

- Graphical user interface
- Local personal telephone directory
- Access to company-wide telephone directory via LDAP
- WAP browser
- Voice-controlled dialing
- Call list containing all incoming and outgoing calls
- Speed-dialing list
- Online help

7.2.4.3 Possible Configurations for the Add-On Devices

The following table shows the possible configurations for add-on devices on telephones from the optiPoint 410 and optiPoint 420 families (not optiPoint 410 entry, optiPoint 410 economy, optiPoint 420 economy and optiPoint 420 economy plus).

Table 7-1 Add-On Device Configuration at an optiPoint 410 and optiPoint 420 Telephone

optiPoint 410 telephone optiPoint 420 telephone	1st add-on device	2nd add-on device
optiPoint410 standard optiPoint 410 advance optiPoint 420 standard optiPoint 420 advance	optiPoint key module	–
	optiPoint key module	optiPoint key module
	optiPoint key module	optiPoint BLF
	optiPoint 410 display module	–
	optiPoint 410 display module	optiPoint key module
	optiPoint 410 display module	optiPoint BLF
	optiPoint 410 display module	optiPoint SLK module
	optiPoint BLF	–
	optiPoint BLF	optiPoint BLF[1]
	optiPoint SLK module	–
	optiPoint SLK module	optiPoint SLK module

1 Configuration with two optiPoint BLFs only with HiPath 3800, HiPath 3750, and HiPath 3700

7.2.4.4 Use of optiPoint 500 Adapters

The following optiPoint 500 adapters are available for use on telephones from the optiPoint 410 and optiPoint 420 families (not optiPoint 410 entry, optiPoint 410 economy optiPoint 420 economy and optiPoint 420 economy plus):

- The adapter must always have a local power supply for operating the connected analog device.
  Note: Floating contacts are not supported when using the adapter on optiPoint 410 and optiPoint 420.
- optiPoint recorder adapter

7.3 optiPoint 500 Product Family

The optiPoint 500 telephones described in this section are compatible with the optiset E telephones. It is possible to operate both telephone families on one SLMO board. You can also use telephones from the two families in mixed host-client configurations (earlier called the master-slave or primary-secondary configuration).

Introduction

optiPoint 500 telephones handle the digital communication of voice and data (voice communication only for optiPoint 500 entry and optiPoint 500 economy). The three dialog keys and the display guarantee convenient and interactive operation. Furthermore, the key lamp principle visualizes the activated functions.

With the exception of optiPoint 500 entry and optiPoint 500 economy, the optiPoint 500 telephones have a USB 1.1 interface. This allows for PC-supported telephoning and Internet access over the USB interface of a PC.

The add-on devices optiPoint key module and optiPoint BLF allow you to increase the number of available function keys.

The various optiPoint 500 adapters allow flexible extension of the telephone workstation. Additional devices (such as personal computers, fax equipment, telephones, headsets) can be connected quickly because it is easy to connect them to the underside of the telephones (not optiPoint 500entry and optiPoint 500 economy) and because the adapters are "plug'n'play".

The optiPoint 500 product family includes the following telephones:

Telephone (product name)	Remark
optiPoint 500 entry	Telephone without display
optiPoint 500 economy	Telephone with display
optiPoint 500 basic	Telephone with display
optiPoint500 standard	Telephone with display
optiPoint 500 advance	Telephone with display

Key Programming

Double key assignment
The programmable function keys of the optiPoint 500 telephones and the optiPoint key modules can have double assignments if only call numbers without LED support are saved on the first level. It is also possible to program call numbers without LED support on the second level. These can be internal station numbers, DID call numbers and call numbers from a HiPath network.
When the Shift function is pressed, the LED lights the Shift key. This signals that the phone numbers on the second key level are available. The Shift function is deactivated after 5 s or after you press a phone number or if the you press the Shift key again.
The optiPoint BLF function keys cannot have double assignments.

HiPath 3000/5000 < V3.0 does not automatically detect optiPoint 500 telephones; it treats them as if they were optiset E telephones:

optiPoint 500 telephone		**Generation/detection by HiPath 3000/5000 and HiPath 3000 Manager E**
optiPoint 500 entry	–>	optiset E basic
optiPoint 500 economy	–>	optiset E advance plus/comfort
optiPoint 500 basic	–>	optiset E advance plus/comfort
optiPoint500 standard	–>	optiset E advance plus/comfort
optiPoint 500 advance	–>	optiset E advance plus/comfort + optiset E key module

Because optiPoint 500 advance has more function keys (4 + 15) than any optiset E telephones (max. 4 + 8), the system generates an optiset E advance plus/comfort with optiset E key module for the optiPoint 500 advance. HiPath 3000 Manager E also recognizes this combination. Use the 4 + 8 function keys of the optiset E advance plus/comfort and the first 7 keys of the optiset E key module to program the 4 + 15 function keys of the optiPoint 500 advance.

7.3.1 optiPoint 500 Telephones without Display

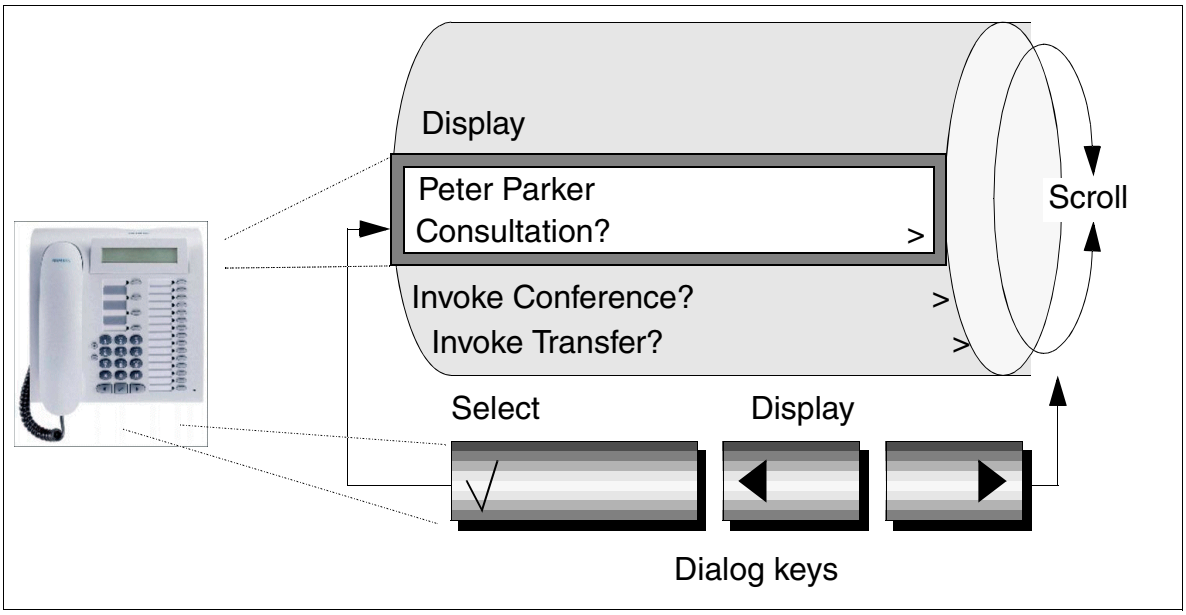
optiPoint 500 entry

The optiPoint 500 entry telephone is an economical entry-level model for access to the digital technology of the HiPath 3000/5000 system. It is designed for common areas and users who require minimal features. The optiPoint 500 entry model has:

- Eight preassigned function keys with LEDs (can be reprogrammed with HiPath 3000 Manager E)
- Open listening
- Two settings keys (plus/minus) for ringer volume, ringer pitch, alerting tone, open listening
- Suitable for wall mounting
- no modularity (no connecting capability for adapters or add-on devices), no display

7.3.2 optiPoint 500 Telephones with Display

The following telephones include alphanumeric displays and provide interactive prompting while a call is in progress. Interactive prompting means that you are offered only functions that are relevant to the current call status. You can access these features using three optiGuide dialog keys: OK, Next and Previous.



For clarity, the functions are arranged in submenus.

You can also select the features directly by using the service key to enter their codes.

You can also assign functions or function loops (macros) to the specific function keys.

optiPoint 500 economy (not for U.S.)

The optiPoint 500 economy is an entry-level display telephone. It has a comprehensive function package, including the following features:

- 12 function keys with LEDs (4 that can be programmed with HiPath 3000 Manager E, 8 freely programmable)
- Alphanumeric LCD swivel display with 2 lines, 24 characters each
- Three dialog keys for interactive prompting “Yes”, “Back”, and “Next”
- Open listening
- Two settings keys (plus/minus) for ringer volume, ringer pitch, alerting tone, open listening
- Suitable for wall mounting
- no modularity (no connecting capability for adapters or add-on devices)

optiPoint 500 basic

The optiPoint 500 basic is a professional telephone with all the features of the optiPoint 500 economy, plus:

- Interfaces and slots:
  - 1 USB 1.1 interface
  - 1 adapter slot (option bay)
  - 1 interface for max. 2 add-on devices

optiPoint 500 standard

The optiPoint 500 standard is a professional telephone with all the features of the optiPoint 500 basic, plus:

- Full duplex speakerphone mode with echo suppression for adapting to the room

optiPoint 500 advance

The optiPoint 500 advance is a professional telephone with all the features of the optiPoint 500 standard, plus:

- 19 function keys with LEDs (4 that can be programmed with HiPath 3000 Manager E, 15 freely programmable)
- Interfaces and slots:
  - 1 integrated USB 1.1 interface
  - 2 adapter slots (option bays)
  - 1 interface for max. 2 add-on devices
  - 1 headset connection (121 TR9-5)

7.3.3 Comparison of Features on all optiPoint 500 Telephones

Feature	optiPoint 500 telephone				
	entry	**economy**	**basic**	**standard**	**advance**
Function keys with LEDs: variable using HiPath 3000 Manager E)	8	4	4	4	4
Function keys with LEDs: programmable	–	8	8	8	15
12-element keypad (0 - 9, #, *)	x	x	x	x	x
Two settings keys (plus/minus)	x	x	x	x	x
Open listening	x	x	x	x	x
Full duplex speakerphone mode	–	–	–	x	x
Adapter slots (bay options)	–	–	1	1	2
USB interface	–	–	1	1	1
Three dialog keys	–	x	x	x	x
Display	–	2 x 24	2 x 24	2 x 24	2 x 24
Connection for optiPoint key module	–	–	x	x	x
Connection for optiPoint BLF	–	–	x	x	x
Optional wall mounting	x	x	x	x	x
Dimensions in mm: • Width • Depth • Height	 159 220 64	 214 220 68	 214 220 68	 214 220 68	 214 220 68
Maximum length of the connecting line in meters: • Without plug-type AC adapter • With plug-type AC adapter	500 1000				
Maximum length of connecting line between primary and secondary telephone (through phone adapter) in meters	100				

7.3.4 optiPoint 500 Add-On Devices

You can use the optiPoint key module and optiPoint BLF add-on devices to increase the number of available function keys on the optiPoint 500 basic, optiPoint 500 standard, and optiPoint 500 advance telephones.

The user usually installs the add-on devices. The installation instructions are on the “Electronic Operating Instructions” CD.

Caution
Always disconnect the line cord before connecting add-on devices to the telephone.

Refer to Section 4.9.3 for model-specific information on the optiPoint key module and the optiPoint BLF.

optiPoint key module

The optiPoint key module is an add-on device (BSG) that should be mounted on the side of the telephone; it provides an additional 16 keys, LEDs and labelling areas for all purposes.
Double assignment can be performed for the keys if only call numbers without LED support are saved on the first level. It is also possible to program call numbers without LED support on the second level. These can be internal station numbers, DID call numbers and call numbers from a HiPath network (see also Page 7-30).

optiPoint BLF

The optiPoint BLF is an add-on device that provides 90 additional keys, LEDs and labeling areas for all purposes.
The connection to the telephone or to an optiPoint key module is made over an interface cable with the following connectors: input MW6 (RJ11), output MW8 (RJ45).
A local power supply (C39280-Z4-C58, C39280-Z4-C70 = USA, C39280-Z4-C66 = UK) is provides power; it can supply a maximum of two optiPoint BLFs.

Programming Add-On Devices

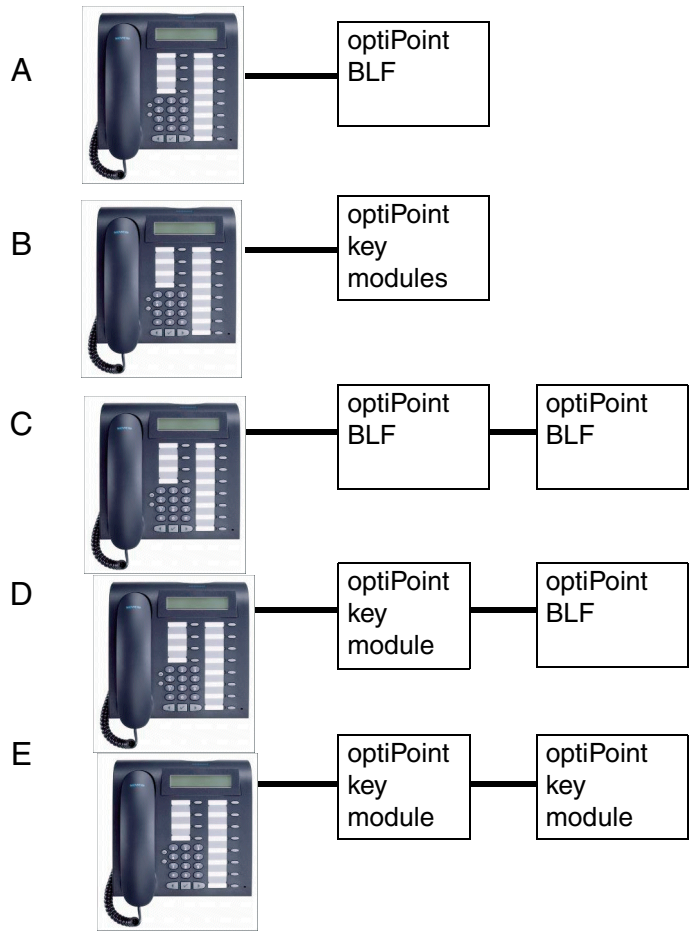
An inserted add-on device automatically registers with the system and is then ready for operation. You can program keys with HiPath 3000 Manager E or Assistant T. If you replace the device, the information programmed under the keys is maintained (stored in the customer database).

If a configuration other than the one shown in the figure is used, the LEDs and keys may not function correctly. You must update the database with HiPath 3000 Manager E.

Example: You replace configuration E by configuration B. You must use HiPath 3000 Manager E to remove the optiPoint key module 2 from the database so that the LEDs and keys function correctly.
You can also use Assistant T to delete optiPoint BLFs and optiPoint key modules.

The first optiPoint BLF that is initially connected to HiPath 3750, HiPath 3550, HiPath 3700, or HiPath 3500 automatically receives standard key assignments (default) for the first 90 system ports. No standard assignment is made if you already configured an optiPoint BLF with HiPath 3000 Manager E or if other optiPoint BLFs are connected.

Possible Configurations for the Add-On Devices



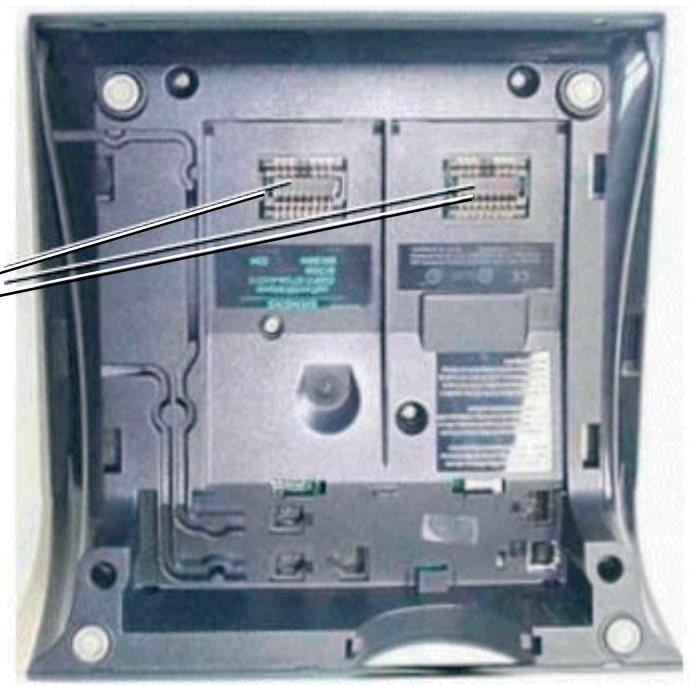
optiPoint 500 basic,
optiPoint 500 standard or
optiPoint 500 advance

7.3.5 optiPoint 500 Adapter

The various optiPoint 500 adapters (not optiPoint 500 entry and optiPoint 500 economy) allow flexible expansion of the telephone workstation by providing additional device connections (such as PC, fax equipment, telephones, headsets).

The adapters, which are to be mounted on the underside of the telephone, are “plug’n’play”. When a new telephone-adapter configuration is plugged in, it generates a reset; a setup message notifies the system of the new configuration.

Option bays



Option bays (adapter slots):

- 2 x for optiPoint 500 advance (shown here)
- 1 x for optiPoint 500 basic and optiPoint 500 standard

optiPoint analog adapter

The optiPoint analog adapter allows an analog device (such as telephone (DTMF only), group 3 fax, modem, cordless telephone) to be connected to the optiPoint 500 telephone.
The connected analog device can send and receive calls to the system on the $U_{P0/E}$ interface regardless of the connection status of the optiPoint 500 telephone, as long as a B channel is available.

The adapter must always have a local power supply for operating the connected analog device.

T/R interface properties:

- Supply current: 30 mA
- Busy signal when both B channels are busy
- Ring sequence: 2.2
- Supports only DTMF with Flash
- No ground signaling allowed

Does not support: VoiceMail server with a/b interface, message waiting lamp, dictating equipment, speaker, announcement device (such as start/stop).

optiPoint acoustic adapter

The optiPoint acoustic adapter is used for connecting

- a headset (121 TR 9-5) (see Section 7.4.3)
- an active loudspeaker box and a desk microphone via the Y cable
- busy display/door opener and secondary bell/light paging, etc. (each with its own power supply) via floating contacts (not supported when using the adapter on optiPoint 410 and optiPoint 420).

Notes on the optiPoint acoustic adapter

- The internal components of the optiPoint terminal are deactivated in speakerphone mode if an external microphone and an external loudspeaker are used (sense lead).
- optiPoint 500 basic does not support the connection of an external microphone to the optiPoint acoustic adapter.
- The speakerphone mode selection is independent of whether the internal or an external speakerphone is used. External speakerphones have precedence over internal speakerphones with the exception of manual intercom and signaling procedures.
- The internal microphone, the transmitter inset and any microphone connected to the optiPoint acoustic adapter are muted in the “Mute” audio state.
- Ring, alarm and key tones are transferred to the internal loudspeaker and not to an external loudspeaker connected to the optiPoint acoustic adapter.
- The volume keys on the optiPoint terminal are used to adjust the volume level of the internal loudspeaker and any connected external loudspeaker. The volume of the external loudspeaker can also be adjusted using the external amplifier.

optiPoint recorder adapter

The optiPoint recorder adapter allows an external recorder or second headset to be connected. Attention: The other party to the conversation must be informed that the conversation is being recorded.

optiPoint ISDN adapter

The optiPoint ISDN adapter provides the basic ISDN access for S_0 devices (max. 2), such as S_0 PC card, group 4 fax equipment, or video communication devices (such as videoset or videokit).

S_0 telephones must have their own power supply for connection.

S_0 interface properties:

- Supports point-to-point and passive bus connections
- Wired for short passive bus configurations

- Cable lengths
  - Maximum 100 m (328 feet) with a cable impedance of 75 ohms
  - Maximum 200 m (656 feet) with a cable impedance of 150 ohms (complies with CCITT recommendation I.430)

The NT terminating resistors are integrated into the ISDN adapter.

optiPoint phone adapter

The optiPoint phone adapter is used for connecting a second optiPoint 500 telephone (client telephone) with its own power supply.
The system treats the client as an independent telephone with its own phone number and B channel which can make or receive calls regardless of the host telephone's status.
The maximum distance between the host and client telephones is approx. 100 m (J-Y (ST) 2x2x0.6, ∅ 0.6 mm).

7.3.6 Restrictions for Using optiPoint Adapters

Adapter Categories

Each $U_{P0/E}$ port in the system provides two B channels. This means that you can connect two telephones, each with a separate phone number, to one $U_{P0/E}$ port.

Category 1 optiPoint 500 adapters
Each of the following adapters needs both B channels and can therefore only be used once on a host telephone.

- optiPoint analog adapter
- optiPoint ISDN adapter
- optiPoint phone adapter

If one of these adapters is used in the optiPoint 500 advance, only a category 2 adapter can be operated in the second slot.

Category 2 optiPoint 500 adapters

The following adapters can be used on the host and client telephones. This is also true if a category 1 optiPoint 500 adapter is already connected.

- optiPoint acoustic adapter
- optiPoint recorder adapter

7.4 Accessories for optiPoint Telephone Solutions

7.4.1 Local Power Supply for optiset E, optiPoint 500 and optiPoint 600 office

You may need a local power supply if you are using large configurations or if you need to extend the range.

You can connect the local power supply to the line cords of a host or client telephone using two MW6 jacks and the included connecting cable (part number see Section 7.4.4).

Data for local power supply AUL:06D1284:

- Line voltage: 220 (230) V AC
- AC line frequency: 47 to 53 Hz
- Output voltage: Max. 50 V, min. 30 V
- Output current: Max. 250 mA

7.4.2 optiPoint 410 and optiPoint 420 Power Supply

The power supply unit features two MW6 jacks. Power is fed to the terminals over the left jack labelled "Digital".

Technical specifications

Technical specifications	Local power supply, Euro C39280-Z4-C510	Local power supply, UK C39280-Z4-C512	Local power supply 110 V U.S. C39280-Z4-C511
Line voltage	230 VAC	230 VAC	120 VAC
AC line frequency	50 Hz	50 Hz	60 Hz
Output voltage	max. 43 VDC, min. 30 VDC	max. 43 VDC, min. 30 VDC	max. 43 VDC, min. 30 VDC
Output current	480 mA	480 mA	480 mA

7.4.3 Headsets

A headset replaces the telephone handset, which means that the user's hands are free when telephoning. It is also possible to use of a cordless headset (121 TR 9-.5)

Section 7.4.4 provides details on the various headset models together with the corresponding part numbers.

A headset key can be configured for optiPoint or optiset E telephones. This allows the user to take calls and to toggle between the handset and the headset.

Figure 7-11 Example of a Corded and a Cordless Headset

Connection options

optiPoint and optiset E telephones not included in the table below do not support headset connection.

Tabelle 7-2 Connection Options for Corded and Cordless Headsets

Telephone	Connection Options for Corded and Cordless Headsets			
	Direct	**Using an optiPoint acoustic adapter[1]**	**Using an optiset E headset adapter headset plus adapter**	**Using an optiset E control adapter**
optiPoint 500 basic		X		
optiPoint 500 standard		X		
optiPoint 500 advance	X	X		
optiPoint 600 office	X	X		
optiPoint 410 standard	X	X		
optiPoint 410 advance	X	X		
optiPoint 420 economy plus	X			
optiPoint 420 standard	X	X		
optiPoint 420 advance	X	X		
optiset E basic			X	
optiset E advance plus/ comfort			X	X
optiset E advance conference/conference			X	X
optiset E memory			X	X

1 Accepting and ending calls using the headset keys is only supported if the connection is established using an optiPoint acoustic adapter.

Information on connecting the headset is provided in the relevant installation instructions.

7.4.4 Part Numbers

The current sales information contains the complete overview of all certified and deliverable products.

Telephone/Accessories	Color	Part Number
optiPoint 500 entry	arctic	S30817-S7101-A101-*
	manganese	S30817-S7101-A107-*
optiPoint 500 economy	arctic	S30817-S7108-A101-*
	manganese	S30817-S7108-A107-*
optiPoint 500 basic	arctic	S30817-S7102-A101-*
	manganese	S30817-S7102-A107-*
optiPoint500 standard	arctic	S30817-S7103-A101-*
	manganese	S30817-S7103-A107-*
optiPoint 500 advance	arctic	S30817-S7104-A101-*
	manganese	S30817-S7104-A107-*
optiPoint key module	arctic	S30817-S7105-A101-*
	manganese	S30817-S7105-A107-*
optiPoint BLF	arctic	S30817-S7107-A101-*
	manganese	S30817-S7107-A107-*
optiPoint phone adapter	arsenic	S30817-K7110-B108-*
optiPoint analog adapter	arsenic	S30817-K7110-B208-*
optiPoint ISDN adapter	arsenic	S30817-K7110-B308-*
optiPoint acoustic adapter	arsenic	S30817-K7110-B508-*
optiPoint recorder adapter	arsenic	S30817-K7110-B408-*
optiPoint 500 entry wall bracket	arsenic	C39363-A328-C338
optiPoint 500 basic wall bracket	arsenic	C39363-A329-C338
Local power supply		AUL:06D1284
Local power supply, UK		AUL:06D1287
Local power supply, 110 V U.S.		AUL:51A4827
Local power supply, Euro		C39280-Z4-C510
Local power supply, UK		C39280-Z4-C512
Local power supply 110 V U.S.		C39280-Z4-C511
Headset Encore monaural		L30460-X1282-X1

Telephone/Accessories	Color	Part Number
Headset Encore binaural		L30460-X1282-X2
Headset Tristar		L30460-X1282-X3
Headset Supra		L30460-X1282-X4
Headset DuoSet		L30460-X1282-X5
Headset Profile monaural		L30460-X1283-X1
Headset Profile binaural		L30460-X1283-X2
Cordless headset		Part number not available.

7.5 optiset E

Telephones in the optiset E product family are supported on a system-specific basis.

7.6 optiPoint 600 office

The optiPoint 600 office convergence telephone offers complete flexibility when it comes to using different network or communication protocols. It supports both Voice over IP and TDM-based switching, and provides access to the relevant HiPath 3000/5000 features.

Features

- Provides both a TDM $U_{P0/E}$ interface and an Ethernet interface, ensuring support for TDM and IP telephony
- Extra-large grayscale display with touchscreen functionality, graphics capability, and optiGuide user interface, offering the highest degree of user-friendliness through practical, straightforward menu guidance
- Local electronic notebook, allowing for fast, convenient access to personal contact details
- Based on the H.323 standard for VoIP
- Support for the entire range of HiPath 3000/5000 telephone features, including automatic callback, executive/security features, conference calls, and group calls
- Excellent voice quality in the LAN through Quality of Service (QoS)
- Integrated 10/100-Mbps mini-switch allowing for the direct connection of a PC workstation to the LAN
- Central power supply over the LAN based on the 802.3a/f standard
- Software updates and feature extensions via FTP

- Easy relocation, as the telephone automatically registers with the system following connection to the LAN

7.6.1 optiPoint 600 office

TDM and IP-based feature telephone with large display

Convergence telephone optiPoint 600 office offers users absolute
flexibility in relation to the network or communication protocol to be used.

optiPoint 600 office supports both Voice over IP and TDM-based switching, and provides access
to the
relevant HiPath™ features.

- Provision of the TDM interface
  The $U_{P0/E}$ and Ethernet interfaces permit flexible use for TDM or IP telephony.
- Extra-large grayscale display with touchscreen functionality, graphics capability, and optiGuide user interface, offering the highest degree of user-friendliness through practical, straightforward menu guidance
- Local electronic notebook, allowing for fast, convenient access to personal contact details.
- Based on the H.323 standard for VoIP

- Support for the entire range of HiPath 3000/HiPath 4000 telephone features, including automatic callback, executive/security features, conference calls, and group calls
- High voice quality in the LAN with Quality of Service (QoS).
- Integrated 10/100-Mbps mini-switch allowing for the direct connection of a PC workstation to the LAN
- Central power supply over the LAN based on the pre802.3af standard
- Administrative measures are not necessary
- Software updates and feature extensions via FTP
- Easy relocation, as the telephone automatically registers with the system following connection to the LAN

With $U_{P0/E}$ and Ethernet interfaces, optiPoint 600 office offers maximum flexibility in terms of which network should be used. optiPoint 600 office transforms the vision of converging networks into a reality.

7.6.1.1 optiPoint 600 office as System Telephone

optiPoint 600 office completes the optiPoint 500 system telephone family. It provides all HiPath-^{TM} features quickly and easily.

The integrated USB 1.1 interface can be used for PC connection. TAPI Service Provider Call Bridge lets you set up calls quickly and easily directly from the PC.

7.6.1.2 optiPoint 600 office as IP Telephone

Developed on the basis of H.323, the CorNet IP protocol supports all telephone features associated with the HiPath 3000 and HiPath 4000 IP communications platform. This means that all telephone features, such as executive/secretary features, group calls, and automatic callback are available as usual. For operation, this telephone uses the same menu system as the optiPoint 500 telephones directly connected to HiPath 3000/HiPath 4000.

Special Digital Signal Processors (DSP) and acoustic algorithms (echo cancellation) guarantee excellent voice quality. Speakerphone mode and open listening are therefore available at a very high acoustic level.

The use of Quality of Service (QoS) protocols both at Ethernet and IP level provides optimum voice quality in the LAN. optiPoint 600 office voice packets are assigned priority bits and are therefore transported through the LAN ahead of any other data packets.

The workstation PC connects to the optiPoint 600 office over the integrated 2-port Ethernet switch. Cost savings can thus be achieved in terms of inhouse cabling and the IP network.

7.6.1.3 Advantages at a Glance

Cost Reduction

- Cabling costs
  No additional wiring necessary for
  optiPoint 600 office necessary. The PC is connected over the integrated switch.
- Infrastructure costs for the data and voice network
  - one network,
  - one investment, and
  - one team for maintenance and service.
- Follow-on costs
  No telephone and system reconfiguration following relocation in IP mode

Investment Protection

- A single device for TDM and VoIP providing for future migration to VoIP
- A single device for the HiPath 3000 and HiPath 4000 IP communications platforms
- The latest feature releases available as software downloads

Intuitive Operation

- Clear overview with large
  display and direct selection via touchscreen functionality
- Interactive prompting with
  dialog keys and display using optiGuide
- Programmable direct access keys
- Direct dialing from the PC with CTI (TAPI)

Flexibility

- Upgrades available as software downloads
- Administration with Web browser and SNMP
- Quick configuration with DHCP (plug and call)
- Compatibility with different workstation environments using adapters and key modules

Covenience

- Optimum voice quality in the LAN through Quality of Service (QoS)
- Speakerphone for spontaneous inclusion of parties present in call with excellent voice quality
- Full access to all HiPath 3000 and HiPath 4000 telephony features
- Direct dialing from the PC
- Large display with touchscreen functionality

7.6.1.4 General Local Features

- Tilting grayscale graphics display with 320*240 pixels (8*24 characters), touchscreen functionality, background lighting and adjustable contrast
- Nineteen programmable function keys with LEDs
- Three dialog keys for interactive user guidance with optiGuide
- Two control key (plus and minus) for setting ringer pitch and volume
- Speakerphone mode and open listening
- Offhook dialing
- Calling party identification
- Key click
- Password protection for administrator-specific data
- DTMF/signaling, inband and outband
- Feature updating with software downloads (via FTP)
- Electronic notebook for 640 entries
- Headset interface
(121 TR9-5 and Polaris)
- Hearing-aid compatibility
- CTI in TDM and IP Mode
- CAPI over USB and CallBridge for Data*
- JAVA Virtual Machine (VM) plus JAVA Development Kit (JDK) for generating user-specific JAVA applications
- Virtual key module (speed dialing application) with 40 speed dialing keys

- WAP bookmarks
- Input of WAP/URL addresses
- Resource sharing for optiPoint 600 entries over the PC keyboard

7.6.1.5 Accessories

Adapter

- optiPoint acoustic adapter
- optiPoint analog adapter*
- optiPoint ISDN adapter*
- optiPoint phone adapter*
- optiPoint recorder adapter

Add-on devices

- optiPoint key module
- optiPoint signature module
- optiPoint BLF

7.6.2 optiPoint 600 office S V2.4

The optiPoint 600 office SIP V2.4 telephone lets the user conduct calls over an IP network (VoIP). If offers the user a particularly good range of features and various hardware options. This IP telephone uses SIP (Session Initiation Protocol) for connections with VoIP communication systems.

The extra-large, background-lit display is graphics-capable and uses touchscreen functionality. This guarantees the user maximum clarity and the highest degree of user-friendliness. A headset port and a wide range of headsets released for the optiPoint family give the user the option of using speakerphone mode.

The optiPoint 600 office SIP V2.4 telephone permits simple Internet surfing based on the WAP protocol that is currently supported by a large number of cell phones. Using a content transformation engine, users can access business information on the local intranet or applications on the Internet. The content scope available is established by the network administrator.

Advantages at a glance

- Compatible and flexible SIP telephone that supports both standard SIP and Siemens SIP implementations as well as enhanced SIP server functionality from third-party vendors.
- Extra-large, background-lit, graphics-capable display with touchscreen function
- Local electronic notebook for fast, convenient access to personal contact details
- Access to internal corporate telephone directories over the LDAP protocol
- Integrated WAP browser for accessing business information in WML format
- Excellent voice quality in the LAN through Quality of Service (QoS)
- Connection over the integrated 10/100-Mbps mini switch means that PC and VoIP share a single cable.
- Software updates and feature extensions via FTP
- Simple workstation switching: the telephone automatically registers with the system following connection to the LAN.

optiPoint 600 office SIP V2.4 overview

The telephone offers numerous features to speed up and enhance business communication, for example, forwarding calls to another connection, call waiting, holding a connection, call forwarding, and conference initiation.

Special digital signal processors (DSP) and acoustic algorithms (echo compensation) guarantee continuous high voice quality, even for speakerphone mode and open listening. Appropriate protocols are used on Layer 2 and 3 to guarantee high voice quality in the LAN environment and thereby achieve QoS. In addition, voice packets can be assigned specific priorities so that they receive priority over data packets for forwarding in the LAN.

An integrated Ethernet switch with two ports permits the connection of a workstation to the LAN network over the optiPoint 600 office SIP. This leads to savings in cabling and IP infrastructure costs.

Accessories

The optiPoint family delivers a range of accessories for optiPoint 600 office SIP V2.4, such as, wall bracket, desk microphone, second handset, and additional connection lines.

7.6.2.1 Features

General features

- Pivoting graphic display with 320 x 240 pixels
- Touchscreen function for all applications (telephony, electronic notebook, etc.) and adjustable contrast
- Nineteen programmable function keys with LEDs
- Sixteen programmable function keys with additional key modules. Double key assignment is possible and up to two modules can be connected.
- Three dialog keys for interactive user guidance
  (available as an alternative to the touchscreen functionality)
- Two control key (plus and minus) for setting ringer pitch and volume
- Country-specific menu system in different languages:
  German, English (U.S.), French, Italian, Spanish
- Speakerphone mode and open listening
- Electronic notebook for storing contact information, such as, names, departments, and telephone numbers
- Headset port
- Separate password protection for user and administration data
- Time on the display (SNTP or local)
- Configurable corporate logo on the display

Call management features

- Connection hold (explicit hold)
- Toggle/alternate between two stations
- Call forwarding (CFU, CFB, CFNR)
- Call waiting
- Consultation hold (implicit hold)
- Transfer call (direct/after consultation)
- Multiple call appearance
- Local conference with three parties
- Monitoring option
- Call rejection
- Telephone name and number display (caller identification)
- Message waiting indication
- Endpoint-generated music in the queue
- Do-not-disturb function
- Adjustable ring tone (up to 15 different ring tones)
- DTMF in-band and DTMF in RTP payload

Call features

- Ten speed-dialing memories over speed-dialing function keys
- URL dialing over the user's Web page
- Redial for the last ten calls in each category: outgoing, missed, forwarded, and answered calls (over call application)
- Last number redial
- On-hook dialing
- Emergency dialing

Network features

- Three ways to route the call:
  direct, over an SIP server or over an SIP gateway
- Basic and digest authentication
- DNS SRV support
- VLAN support (VLAN ID configuration either manual or by DHCP manufacturer)
- VLAN tagging (IEEE 802.1p/Q)
- Layer 2 and Layer 3 can be set for Quality of Service (QoS)
- Outbound proxy support
- Silence suppression
- Handling of out-of-sequence packets
- Support for 10-ms and 20-ms data packets
- Jitter buffer

Application features

- WAP Push to receive and show WAP messages on the display
- WAP browser that supports bookmarks and WAP/URL entries
- Speed-dialing application (based on the integrated JAVA Virtual Machine)
- Resource-partitioning application (for navigating the optiPoint 600 office display with the existing PC keyboard and mouse)
- Integration of the internal telephone directory over LDAP
- Electronic notebook for saving the personal address book
  (up to 640 entries)
- Call log function (to store up to ten calls in each category: outgoing, missed, forwarded, and answered calls). The data can be used for calls or incorporated in the electronic notebook.

Accessories

Adapter

- optiPoint acoustic adapter
- optiPoint phone adapter

Add-on devices

- optiPoint key module

Adapters and add-on devices from the optiPoint 500 family can also be used.

Accessories

- Wall bracket
- Connecting lines:
  – RJ6/RJ6 cable – Cat 5 LAN cable
- Cable accessory:
  – USB 1.1 cable with USB angular plug connector
  – Y cable for an additional loudspeaker and a desk microphone
- Headsets: all Siemens or Plantronics headsets
- Desk microphone
- Active loudspeaker

7.6.2.2 Technical Specifications

Protocols

- SIP (over TCP/UDP/TLS), HTTP, FTP, DHCP, SNMP, SNTP, DNS
- QoS in accordance with DIFFSERV and IEEE 802.1 p/Q

Administrative features

- Straightforward administration over the Siemens Deployment Tool or the SIP server (Centralized Management), over the local telephone menu or Web pages
- DHCP, SNMP and DNS support

Hardware properties/interfaces

- 2-port 10/100-Mbps mini switch
- 2 RJ 45 TP
- USB host for connecting a keyboard
- USB client
- Voice compression in accordance with G.711, G.723.1, and G.729
- Echo compensation

Power supply unit

- Local power supply unit (separate module for EU, UK, and US)
- Power-over-LAN in accordance with the pre-standard 802.3 (used pairs/unused pairs) and Cisco-proprietary PoL implementation (without CDP support)

Dimensions, weight, color

- Dimensions: (L) 235 mm x (W) 215 mm x (H) 91 mm
- Colors: arctic and manganese
- Weight: 940 g

7.7 Telephones for HiPath cordless

7.7.1 Gigaset 3000 Comfort Feature Handset

The Gigaset 3000 Comfort feature handset has elements that allow the user to easily set up and release voice connections as well as initialize and invoke procedures and enhanced features.

A tango version for Latin America (frequency range 1.91 - 1.93 GHz) is not available.

Main Features

- 12-button alphanumeric keypad (0-9,*,#)
- 3 function keys:
  - 1 menu key for menu selection
  - 2 dual-mode keys for up to four soft key functions
- Seizure key (on-hook)
- Release key (off-hook)
- Hookswitch (register recall)
- Speakerphone
- Illuminated display (up to four lines and 16 columns)
- Enhanced user prompting with on-screen messages (multilingual)
- Handset phone book for approx. 100 entries. Redial option for last five numbers dialed.

Technical Specifications

- Power supply by two battery cells:
  - NiCd (700 mAh is supplied): Talk time up to 10 hours, standby time up to 100 hours
  - NiMH (1100 mAh): Talk time up to 15 hours, standby time up to 160 hours
  - NiMH (1500 mAh): Talk time up to 20 hours, standby time up to 220 hours
- Weight incl. battery: approx. 165 g
- Dimensions: approx. 160 x 50 x 28 mm (L x W x D)
- Permitted environmental conditions for operation:
  - +5 °C to +45 °C
  - 20% to 75% relative humidity

7.7.2 Gigaset 3000 Micro Handset

The Gigaset 3000 Micro handset has elements that allow the user to easily set up and release voice connections as well as initialize and invoke procedures and enhanced features.

Main Features

- 12-button alphanumeric keypad (0-9,*,#)
- 3 function keys:
  - 1 menu key for menu selection
  - 2 dual-mode keys for up to four soft key functions
- Seizure key (on-hook)
- Release key (off-hook)
- Hookswitch (register recall)
- Illuminated display (up to four lines and 16 columns)
- Enhanced user prompting with on-screen messages (multilingual)
- Handset phone book for approx. 100 entries. Redial option for last five numbers dialed.

Technical Specifications

- Weight incl. battery: Approx. 98 g
- Dimensions: Approx. 122 x 43 x 18 mm (L x W x H)
- Permitted environmental conditions for operation:
  - +5 °C to +45 °C
  - 20% to 75% relative humidity

7.7.3 Gigaset 4000 Comfort Handset

The Gigaset 4000 Comfort handset has elements that allow the user to easily set up and release voice connections as well as initialize and invoke procedures and enhanced features.

Main Features

- Alphanumeric 12-digit keypad
- 2 display keys
- Control key (navigation key)
- 6 function keys:
  - Off-hook key
  - On-hook and on/off key
  - Speakerphone key
  - Caller list
  - Keylock (#)
  - Star key (*)
- Hookswitch key function (flash)
- Speakerphone mode and open listening
- Illuminated graphics display (5 lines, 101 x 64 pixels)
- Multilingual (13) user prompts

- Handset phone book for approx. 200 entries. Redial option for last five numbers dialed.

Technical Specifications

- Power supply by two NiMH battery cells: Talk time up to 34 hours, standby time up to 400 hours
- Weight incl. battery: approx. 150 g
- Dimensions: approx. 155.5 x 53.6 x 36.2 mm (L x W x D)
- Permitted environmental conditions for operation:
  - +5 °C to +45 °C
  - 20% to 75% relative humidity

7.7.4 Gigaset 4000 Micro Handset

The Gigaset 4000 Micro feature handset has elements that allow the user to easily set up and release voice connections as well as initialize and invoke procedures and enhanced features.

Main Features

- Alphanumeric 12-digit keypad
- 2 display keys
- Control key (navigation key)
- 6 function keys:
  - Off-hook key
  - On-hook and on/off key
  - Speakerphone key
  - Caller list
  - Keylock (#)
  - Star key (*)
- Hookswitch key function (flash)
- Illuminated graphics display (5 lines, 101 x 64 pixels)
- Multilingual (13) user prompts
- Handset phone book for approx. 200 entries. Redial option for last five numbers dialed.

- Vibrating alarm

Technical Specifications

- Power supply by NiMH battery pack: Talk time up to 15 hours, standby time up to 250 hours
- Weight incl. battery: approx. 100 g
- Dimensions: approx. 112.5 x 45.1 x 24.7 mm (L x W x D)
- Permitted environmental conditions for operation:
  - +5 °C to +45 °C
  - 20% to 75% relative humidity

7.7.5 Gigaset 3000L Charger

Charging option for the Gigaset 3000C handset.

Main Features

- Easy wall or desktop mounting
- Visual display indicating the charging status
- Charging times:
  - For NiCd cells (600m Ah): 4 to 5 hours (in the handset)
  - For NiMH cells (1100/1300 mAh): 8 to 10 hours (in the handset)

7.7.6 Gigaset 3000L Micro Charger

Charging option for the Gigaset 3000 Micro handset.

Main Features

- Visual display indicating the charging status
- Approximate charging time for NiMH-Power Pack (600 mAh) in handsets: 5 hours

7.7.7 Gigaset S1 professional Handset

- Handset lock with four-digit PIN code
- Charging option in disabled status (PIN set)
- Illuminated speakerphone key
- Illuminated MWI key
  – Easy access to message list
  – New message signal
- Telephone directory
  – Telephone directory for up to 200 call numbers/names
  – Text input assistance for telephone directory
- Voice dialing for up to 29 entries
- Display
  – Illuminated five-line graphics display

  In idle state:
  – Local display editing
  – Date/time display
  – Background image (logo) display (with date/time below)
  – Status display for battery charging and receive field strength

- Telephoning
  - Dial preparation (call number entry before line seizure) with correction option
  - Redial option for last ten numbers dialed
  - Automatic redial
  - Delete function for entire redial memory
  - Speed dialing keys 2-9, 0
- DPS (DECT Position System)

Personal Settings

- Adjustable ringer settings for internal and external calls with 10 tones/melodies
  - Ring tones 1-3, freely selectable
  - Ringer melodies 4-10, freely selectable
- Adjustable handset volume (three levels)
- Visual call signaling (LED speakerphone key)
- Menu guidance in 19 languages
  German, English, French, Italian, Spanish, Portuguese, Dutch, Danish, Swedish, Norwegian, Finnish, Turkish, Czech, Polish, Greek, Hungarian, Slovenian, Croat, Russian.

Individual signaling of internal and external calls: Internal call is set by default to melody 4, and external call is set to melody 8.

7.7.7.1 Technical Specifications

Ranges	Outdoors: up to 300 m Indoors: up to 50 m
Handset operating times	Standby up to 170 hours Talk time up to 13 hours
Dimensions (L × W × D in mm)	Handset: 147 × 54 × 26
Color	Dark blue
Gigaset S1 Charger	Charging time for NiMH battery cells 8 to 9 hours Power supply unit Local power supply 220/230 Vac Local power supply 110 Vac Dimensions (L x W x D in mm) 101 x 74 x 41

7.7.8 Gigaset S2 professional Handset

- Handset lock with four-digit PIN code
- Charging option in disabled status (PIN set)
- Illuminated speakerphone key
- Illuminated MWI key
  – Easy access to message list
  – New message signal
- Telephone directory
  – Telephone directory for up to 200 call numbers/names
  – Predictive text for telephone directory
- Voice dialing for up to 29 entries
- Display
  – Illuminated five-line graphic display (101 x 80 pixels, 4096 colors)

  In idle state:
  – Local display editing
  – Date/time display
  – Background image (logo) display (with date/time below)

  - Status display for battery charging and receive field strength

- Telephoning
  - Dial preparation (call number entry before line seizure) with correction option
  - Redial option for last ten numbers dialed
  - Automatic redial
  - Delete function for entire redial memory
  - Speed dialing keys 2-9, 0

- V.24 PC interface (via data cable/mini-Lumberg)
  - Administration of telephone directory/e-mail entries/call-by-call list/redial list
  - Setting ring tones and volumes
  - Loading polyphonic ring tone melodies and logos

- Headset connection via Lumberg mini connector

Personal Settings

- Ring tone can be set for internal and external calls
  - three ring tones
  - 17 standard melodies
  - 16 loadable polyphonic ring tone melodies

- Adjustable handset volume (three levels)

- Visual call signaling (LED speakerphone key)

- Menu guidance in 19 languages
  German, English, French, Italian, Spanish, Portuguese, Dutch, Danish, Swedish, Norwegian, Finnish, Turkish, Czech, Polish, Greek, Hungarian, Slovenian, Croat, Russian.

7.7.8.1 Technical Specifications

Ranges	Outdoors: up to 300 m Indoors: up to 50 m
Handset operating times	Standby time up to 150 hours Talk time up to 10 hours
Dimensions (L × W × D in mm)	Handset: 141 × 51 × 28
Weight	110 g including batteries
Color	Dark blue

Gigaset S2 professional charger	Charging time for NiMH battery cells 8 to 9 hours Power supply unit Local power supply 220/230 Vac Local power supply 110 Vac Dimensions (L x W x D in mm) 95 x 80 x 60

7.7.9 Gigaset S1 professional Handset

Gigaset SL1 professional is the smallest and lightest DECT telephone.

- Handset with illuminated, five-line graphic display
- Handset lock with four-digit PIN code
- Charging option in disabled status (PIN set)
- Illuminated speakerphone key
- Menu prompts in 19 languages
- Illuminated MWI key
  - Easy access to message list
  - New message signal
- Telephone directory
  - Telephone directory for up to 200 call numbers and names
  - Voice dialing for up to 23 numbers on the handset
  - Predictive text for telephone directory

- Telephoning
  - Dial preparation (call number entry before line seizure) with correction option
  - Redial option for last ten numbers dialed
  - Automatic redial
  - New menu options: redial memory deletion option
  - Speed dialing keys 2 – 9, 0
  - Enhanced speakerphone
- Display:
  - Local display editing
  - Date/time display
  - Background image (logo) display (with date/time below),
  - Status display of battery charging and receive field strength
- PC interface for telephone directory transfer, download of polyphonic melodies and background logos
- Headset connection (slim Lumberg connector, MP accessory)
- Programmable ring tones for internal and external calls with ten standard melodies and 16 polyphonic ring tone melodies
- Vibrating alarm
- Calendar function for alarm clock, appointments (reset after switching off)
  - Visual and acoustic signaling of appointments
  - Insertion of texts for appointments (five appointments)
- Adjustable handset volume (three levels)

7.7.9.1 Technical Specifications

Handset operating times	Standby time up to 250 hours Talk time up to 15 hours
Dimensions (L × W × D in mm)	Handset: 114 × 47 × 22
Weight	100 g including batteries
Color	Dark blue
Gigaset SL1 professional charger	Charging time for NiMH battery cells 8 to 9 hours Power supply unit Local power supply 220/230 Vac Local power supply 110 Vac Dimensions (L x W x D in mm) 76 x 76 x 28

7.7.10 Gigaset M1 professional Handset

Gigaset M1 professional is an extremely sturdy handset based on the digital DECT/GAP standard for use in areas where devices need to be

- shockproof and unbreakable,
- impervious to spray water and
- dust.

- Housing
  - Spray-resistant (IEC 529 IP64)
  - Dustproof
  - Break- and shockproof
  - Silicon-free interface
  - Sturdy carry clip
- Immunity to interference in compliance with EN 50 082-2 (industrial environment)
- Acoustics optimized for industrial environments
- Keyboard
  - Modified key layout
  - Illuminated display
  - Direct call for alarm
- Telephone directory
  - Telephone directory for up to 200 entries

  - Voice dialing for up to 28 numbers on the handset
  - PC-based telephone directory management

- Display
  - Illuminated, five-line graphic display

  In idle state:
  - Date/time display
  - Status display for battery charging and receive field strength

- Speakerphone
  - Illuminated speakerphone key
  - Full-duplex speakerphone mode

- Telephoning
  - Dial preparation (call number entry before line seizure) with correction option
  - Redial option for last ten numbers dialed
  - Automatic redial
  - Optical call and appointment signaling
  - External room monitoring

- PC interface via data cable (Lumberg)
  - Used for:
    telephone directory entry management
  - PC software and data cable as accessories compatible with C35, C45; M35; ME45, S25, S35; S45, SL45
  - SoftDataLink 5.0 software can be obtained from retail outlets/ICM or downloaded free of charge from
    www.siemens-mobile.com/gigaset-sds

Personal Settings

- Ring tone combined with vibrating alarm (deactivation possible)
- Can be charged by external charging unit connected via Lumberg jack
- Key-based ringer cutoff
- Telephone volume (five settings)
- Ringer volume (seven settings)
- Ringer melody (ten settings)
- Handset volume (three settings)

Languages

- Menu prompts in 14 languages, including Polish

7.7.10.1 Technical Specifications

Handset operating times	Standby time up to 250 hours Talk time up to 15 hours
Dimensions (L × W × D in mm)	Handset: 150 × 57 × 25
Weight	141 g including batteries
Operating temperature	Handset: -10 °C to +55 °C
Charger	Charging time for NiMH battery cells (500 mAh) approximately 5.5 hours Power supply unit Local power supply 220/230 Vac Local power supply 110 Vac Dimensions (L x W x D in mm) 80 x 110 x 52

Headset

Lumberg-based connection

Gigaset 4000H ear clip

GN2100 NC headband

(1 or 2 ears), noise-suppressing microphone

GN2100 UNC headband

(1 or 2 ears), microphone with advanced noise suppression

MickeyMouse headband

with hearing protection for use in extremely loud environments.

7.8 optiPoint WL2 professional/optiPoint WL2 professional S

optiPoint WL2 professional is a telephone designed to simplify corporate access to data and resources over WLAN.

WLANs are transparent within the context of IP traffic and therefore provide an ideal environment for IP multimedia applications. The advent of real-time IP communication in the form of voice, for example, represents a logical step forward because it implements investments made in converging LANs and extends the range of a company's IP telephony and multimedia communication system.

The Siemens optiPoint WL2 professional and optiPoint WL2 professional S 802.11 WLAN telephones offer all the features currently needed for wireless telephony (for example, polyphonic ring tone melodies, graphic display, and different applications in the telephone). optiPoint WL2 professional is CorNet-compliant and offers a wide range of HiPath 4000 and HiPath 3000 telephony features and applications for wireless users. optiPoint WL2 professional S supports SIP and is thus the ideal solution for the growing SIP (Session Initiation Protocol) market. It supports SIP-capable systems from both Siemens and other vendors.

Properties

Wireless LAN Voice-over-IP telephone with color graphic display.

optiPoint WL2 professional can be operated with HiPath 3000/5000 V5.0 or later.
optiPoint WL2 professional S is the ideal solution for SIP systems and can be used with HiPath 3000/5000 V6.0.

- **Interfaces:** WLAN, USB
- **Standards:** WLAN, 802.11b (11 Mbps), 802.11g (full support for 54 Mbps), CorNet IP, SIP

Configuration

- Wireless connection with a WLAN access point as the link to a LAN switch
- IP connection to the HG1500 gateway in the HiPath 3000 system; CorNet-IP registration
- IP connection to an SIP proxy/registrar: SIP registration
- Basic DHCP configuration
- Advanced configuration over the telephone's Web page (single telephone) or using the HiPath Deployment Service.

Features

Telephone

- Telephone with color graphic display
(six lines, 128x128 pixel resolution, 4096 colors, 3.1 cm x 3.1 cm)
- Call animation and caller display (CLIP)/caller ID for incoming calls
- Illuminated keypad
- Two softkeys for dynamic access to features
- Intuitive user prompting
- Illuminated MWI key
- Speakerphone key
- Status display in standby or idle mode shows: date, time, battery status, RF signal strength, access point connected
- Status display during the call shows: battery status, RF signal strength, time per call, off-hook handset, CLIP/caller ID
- Missed calls display
- Speakerphone function
- Display of all answered calls
- Dialing by entering numbers, SIP-URI (professional S), and IP address (direct IP call)
- Multi-line functionality
- Configurable speed-dialing keys
- Dial preparation (telephone number entry without line seizure) with correction option
- Redial for the last ten different numbers dialed
- Key-activated keypad lock and ringer cutoff with icon display
- Same user interface as Siemens desktop telephones over the optiGuide user interface (professional S)
- Access to HiPath features (depends on the HiPath system connected) for call features, such as, callback, conference, consultation hold, etc.
- Local SIP features (professional S): hold, mute, transfer, three-party conference, MWI, DND, etc.
- SIP features with server support: group pickup, priority alerting, distinctive ringing, keyset, shared call appearance, bridge line appearance, etc.

Local telephone directory

- Extensive local telephone directory/address book
- CLIP is replaced by the telephone directory entry in the telephone or in the HiPath system

Audio

- Six polyphonic ring tones (adjustable volume)
- Sixteen ring tones, 12 of which are managed by the HiPath system and four of which are managed by the user
- Ring tones can be downloaded
- Volume adjustment in eight levels
- CLIP-/caller-ID-dependent ring tones
- VIP calls

Value-added applications and features

- Caller voice announcement[1)]
  (CLIP/caller ID)
- Voice dialing
- Polyphonic ring tones (available for download)
- Access to LDAP directories
- Headset connection via a Slim Lumberg connector
- Vibrating alarm
- Dimensioned for broadband voice transmission (optional, G.722)
- CTI interface
- Upgrades and configurations can be performed by radio OTA (Over The Air) with the HiPath Deployment Service, an advanced management application
- Support for HiPath applications

Codecs

- G.711 (a-law and µ-law)
- G.729ab (G.729a with VAD (Voice Activity Detection))
- G.723
- G.722 (optional)

- Advanced Echo Cancellation (AEC)

QoS*

- ToS
- DiffServ
- 802.1q
- 802.11e (WME subset)

Accessories

- Desktop charger
- Desktop charger with option for charging a second battery
- USB data cable
- Wide range of available headsets
- Various carry options available
- Mains voltage adapter (suitable for the relevant geographical region)

Additional features

- WEB Browser-based administration
- Multilingual user interface
- Date and time synchronization with NTP server or HiPath system
- Range: indoors: up to 30 m (depending on the environment)
  outdoors: up to 300 m (depending on the environment)
- Power supply unit (Li-Ion, 3.7 V, battery)
- Operating times: talk time up to 4 hours; standby time up to 80 hours
- Weight: approx.100 g
- Dimensions:
  Telephone: 132 x 52 x 22 mm (LxWxH),
  Charger: 70 x 73 x 35 mm
- Color: Light Cashmere Silver

Wireless features

- 802.11g (fallback to 802.11b)

- Frequency range: 2.4 – 2.497 GHz
- Number of channels available: 13 (ETSI) or 11 (North America)
- Adjustable output power: approx. +20 dBm EIRP
- Site Survey Tool integrated in the telephone
- Data rates: 54, 48, 36, 24, 18, 12, 11, 9, 6, 5.5, 2, 1 Mbps
- SSID

Security features

- WEP (64, 128 bits)
- WPA
- Cisco infrastructure support over CCX
- Telephone can be PIN-protected
- VPN client
- Authentication (login/password)
- 802.11i (optional, if the standard is agreed)

Authentication

- EAP-TLS
- LEAP

Protocol/network features

- DHCP client
- FTP client
- VLAN support
- SNMP Trap Agent
- VoIP (SIP, RTP, RTCP, TLS)
- DNS
- HTTP and HTTPS server
- PPTP for VPN support
- UPNP (checkpoint and device)

- IP addressing: fixed, DHCP, PPPoE

PC software

- PC tool for replacing telephone directory data from Microsoft Outlook and the WLAN telephone's local telephone directory
- Downloading ring tones from the PC to the telephone

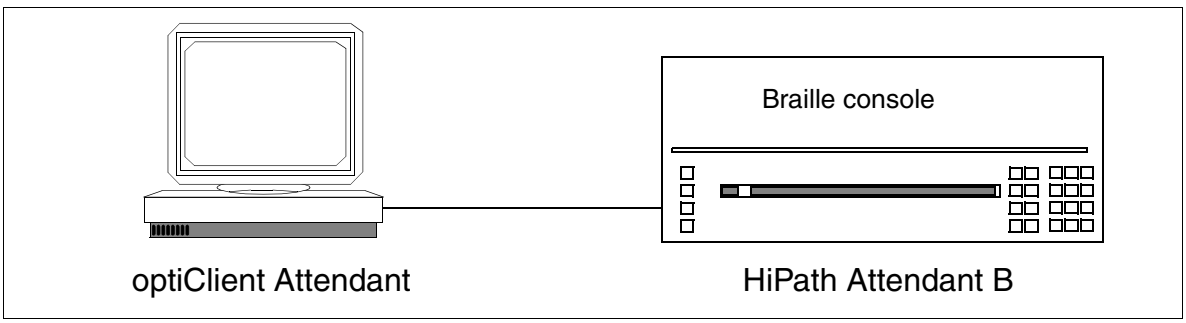
7.9 Attendant Consoles

7.9.1 HiPath Attendant B Braille Console

Definition

The HiPath 3750, HiPath 3550, HiPath 3700 and HiPath 3500 systems include a convenient, user-friendly braille console as an attendant position for visually impaired attendants.

optiClient Attendant (PC attendant console) is required to operate the HiPath Attendant B braille console.



The braille console's braille output line (40 characters) displays the current optiClient Attendant status information. The keys on the braille console provide access to nearly all optiClient Attendant functions. So visually impaired users can perform most of the same switching tasks as their seeing colleagues.

At power-on, the console starts in auto-information mode, providing the user with instructions on the main functions for orientation purposes. For further instructions, the attendant can activate an information mode that provides extensive operating information on the braille output line.

The braille console automatically uses the language set in optiClient Attendant. It currently supports German and English. Other languages are under preparation.

Model-Specific Data

Subject	HiPath 3750 HiPath 3700	HiPath 3550 HiPath 3500	HiPath 3350 HiPath 3300	HiPath 3250	HiPath 3150
Feature available in	**x**	**x**	**–**	**–**	**–**
Hardware requirements	Braille console		–	–	–
Software requirements	V1.0 or later	V1.0 or later	–	–	–
Number of connectable braille consoles	1	1	–	–	–

The Attendant B braille console can be ordered directly from:
Winkler Kommunikationstechnik
Ahornstrasse 12
26180 Rastede/Ipwege
Germany
Tel.: ++49-4402-929292
Fax: ++49-4402-929294
http://www.juergen-Winkler.com
Ordering designation: BT-H150 Office-PCVF-001-A
Delivery time is roughly six weeks after receipt of order.

7.9.2 optiClient Attendant (V7.0)

Definition

The optiClient Attendant is a PC-based attendant console which can be connected to the HiPath 33xx, 35xx, 37xx, 38xx and HiPath 5000 systems. Depending on the model, up to six optiClient Attendants can be installed per node.

The optiClient Attendant can also be used as a central attendant console in a network with multiple HiPath 3000 systems.

optiClient Attendant V7.0 replaces the previous optiClient Attendant V6.0 for all connection types (USB, V24 and LAN).

optiClient Attendant V6.0 will no longer be marketed.

optiClient Attendant V7.0 has been approved for HiPath 3000 V1.2, V3.0, V4.0 and V5.0.

Changes in comparison to version 6.0:

- With the TCP/IP connection variant, the optiClient Attendant V7.0 runs independently. In the optiClient Attendant V7.0 installation package, all software components for LAN-based operation are already included. The only other requirement for operation is a ComScendo license for IP workpoints. This does away with the need to market the optiClient 130 as a base for an optiClient Attendant based on TCP/IP-. In the TCP/IP connection variant the optiClient Attendant can be connected to HiPath 3000 V3.0, V4.0 and V5.0 via HG 1500 V3.0.
- optiClient Attendant V7.0 is licensed centrally via HiPath License Management.
- In terms of the features offered, version 7.0 corresponds to the latest version of optiClient Attendant V6.0 (version 6.0.11).
- Because of the released Windows 2000 and XP operating systems, the system property requirements for the PC are higher.

Connection Types

1. Connection using TCP/IP via HG 1500 V3.0
2. Connection with optiPoint 500 or 600 USB interface
3. Connection to optiset E Control Adapter

optiClient Attendant V7.0 features

- Waiting calls are displayed with type, name and phone number
- Acoustic signaling with volume control
- Display of switching state for calling and destination stations
- Answer pending calls
- Selection of telephone directories:
  - Outlook contacts
  - HiPath telephone directory
  - Internal Attendant telephone directory, based on Microsoft Access
  - LDAP on Microsoft Active Directory server
  - Access to telephone directory CD
- Notepad functionality for saving and dialing phone numbers
- Call statistics for incoming calls with sort function according to various criteria
- Convenient caller list with an almost unlimited number of entries, sorted according to date and time
- Extra functions such as hold button, call override, callback, conferencing, radio paging, speaker announcements, alarms, call detail display, redial (last 10 numbers dialed)
- Windows online help
- Convenient configuration of individual features
- Service tools for diagnosis and logging
- Simple installation program
- User interface currently available in German, English, Dutch, Portuguese, Italian, French and Spanish
- Associate call detail information for individual calls with automatic display in notepad (printable).
- Optional braille console connection. More detailed information on the braille console can be found in the system description.

- Busy lamp fields offer the following features:
  - Each busy lamp field contains 140 names with 16 characters each or 240 call numbers of 6 digits each
  - Display of up to three busy lamp fields
  - Optional connection of second monitor
  - Configuration of busy lamp fields to suit individual user requirements
  - BLF zooming with automatic font size adjustment
  - Speed dialing via busy lamp field
  - Color display of station status: idle, calling, busy internal, External Res., diverted, Do Not Disturb
  - Memo function for each BLF station for individual user information
  - Configuration of up to two representatives for each BLF station with dialing function
  - Sort function to list BLFs or their components according to station number or in alphabetical order
  - Name definition for BLFs
  - Definition of titles for groups of BLF stations

The scope of functions can vary when connected to HiPath 3000 < V5.0.

Upgrading earlier versions of optiClient Attendant:

optiClient Attendant V5.0 and earlier Attendant P systems:

- for each new optiClient Attendant V7.0: Order item L30250-U600-A213

optiClient Attendant V6.0:

- for each optiClient Attendant V7.0 upgrade: Order item L30250-U600-A214

optiClient Attendant compatibility with HiPath 3000

	HiPath 3000/5000 V5.0	HiPath 3000/5000 V4.0	HiPath 3000/5000 V3.0	HiPath 3000/5000 V1.2
optiClient Attendant V7.0	Yes	Yes	Yes	Yes, via V.24, USB
optiClient Attendant V6.0	No, i.e. cannot start up	Yes	Yes	Yes
optiClient Attendant V5.0	No, i.e. cannot start up	No	Yes	Yes

PC system requirements:

- PC Pentium III 750 MHz, at least 128 MB RAM
- Minimum graphics resolution of 1024 x 768 pixels
- Sound card with speaker for ringer signaling
- In the case of Windows®2000, the following configuration must be carried out for signalling via the soundcard: Select Start/Settings/Control Panel/Sounds and Multimedia/Sounds and activate "Only use preferred devices".
- Microsoft-compatible mouse
- CD-ROM or DVD drive
- Min. 40 MB free space on the hard disk
- Either Windows 2000® or Windows XP® operating system
- For operation with TCP/IP connection:
  - Functional operating system with network and sound card configured
- For operation with USB:
  - optiPoint 500/600 telephone with USB interface,
    USB cable (code number: S30267-Z360-A30-1),
    USB driver (included in CallBridge TU software)
    and a free USB port on the PC.
- For operation with optiset E control/data adapter:
  optiset E telephone with adapter slot and a free RS 232 interface on the PC (COM port 1 – 4).
  If the licensing components CLA and CLM are installed on the same PC, you also have to consider their system requirements.

Overview of supported Microsoft operating systems by connection type

Connection type	Windows 98	Windows NT V4.0	Windows 2000	Windows XP
control adapter	No	No	X	X
USB interface	No	No	X	X
TCP/IP	No	No	X	X

Licensing

A license is required for optiClient Attendant V7.0. optiClient Attendant V7.0 is licensed centrally via HiPath License Management.

When optiClient Attendant V7.0 is initially started on HiPath 3000 5.0, it can be operated within the grace period of the HiPath 3000 without a license for a maximum of 30 days.
When optiClient Attendant V7.0 is initially started on HiPath 3000 <V5.0, it can be operated within the grace period of the optiClient Attendant without a license for a maximum of 30 days.

Depending on the HiPath 3000 software version, licensing is performed either at the HiPath 3000 or optiClient Attendant terminal.

Line	optiClient Attendant	HiPath 3000	Marketing optiClient Attendant	License Server (CLS) Creates License for	Comments
1	V7.0 (new)	V5.0	New product L30250-U600-A213	HiPath 3000 V5.0	V7.0 to be installed, licensed on HiPath 3000
2	V6.0 -> V7.0	< V5.0 -> V5.0	Upgrade version L30250-U600-A214	HiPath 3000 V5.0	License switch from Attendant V6.0 to licensing on HiPath 3000 V5.0. A HiPath 3000 V5.0 license is generated using the CD key as proof of an existing license.
3	V3.0, 4.0 5.0 -> V7.0	< V5.0	New product L30250-U600-A213	Attendant V7.0	V7.0 to be installed, licensed on Attendant V7.0
4	V6.0 --> V7.0	<= V4.0	Upgrade version L30250-U600-A214	Attendant V7.0	License switch from Attendant V6.0 to Attendant V7.0. An Attendant V7.0 license is generated using the CD key as proof of an existing license.
5	V7.0	V4.0 --> V5.0	Upgrade version L30250-U600-A214	HiPath 3000 V5.0	License switch from Attendant V7.0 to HiPath 3000.
6	V6.0 --> V6.0 Rehosting	<= V4.0	Not relevant.	Not relevant.	When rehosting the optiClient Attendant V6.0, for example, PC exchange at the customer site, licensing is performed as described in V6.0. Rehosting is **not possible on the CLS**. The upgrade item incurs only minimal costs for CD shipping

Model-Specific Data

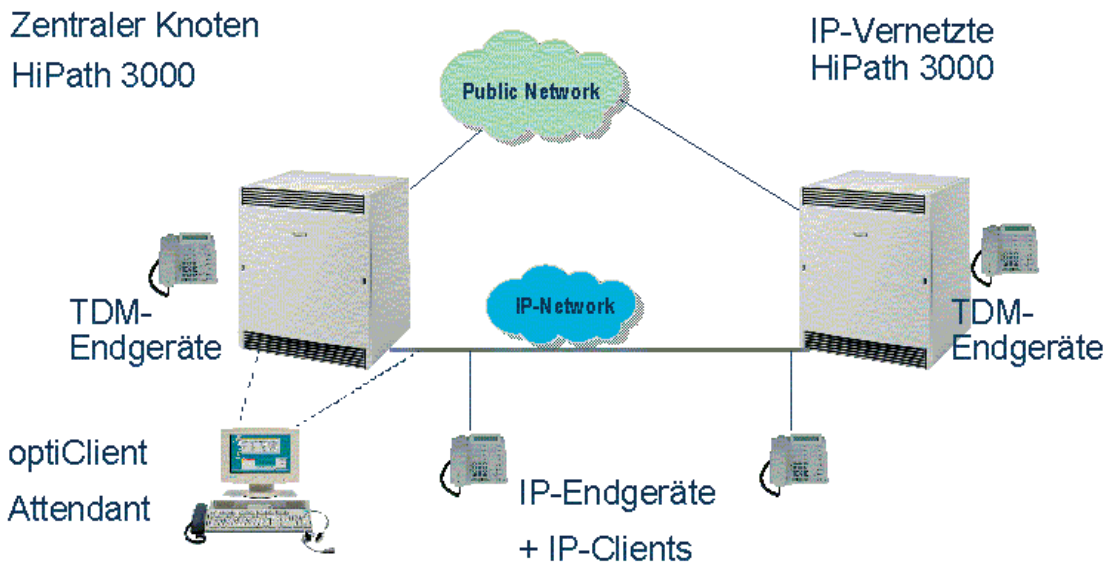
Subject	HiPath 3800	HiPath 3750 HiPath 3700	HiPath 3550 HiPath 3500	HiPath 3350 HiPath 3300
Feature available in	**x**	**x**	**x**	**X**
Hardware requirements				–
Software requirements	V5.0 or later	V1.0 or later	V1.0 or later	V1.0 or later
Max. no. of optiClient Attendants	6	6	4	4

7.9.2.1 optiClient Attendant V7.0 as a Central Attendant Console

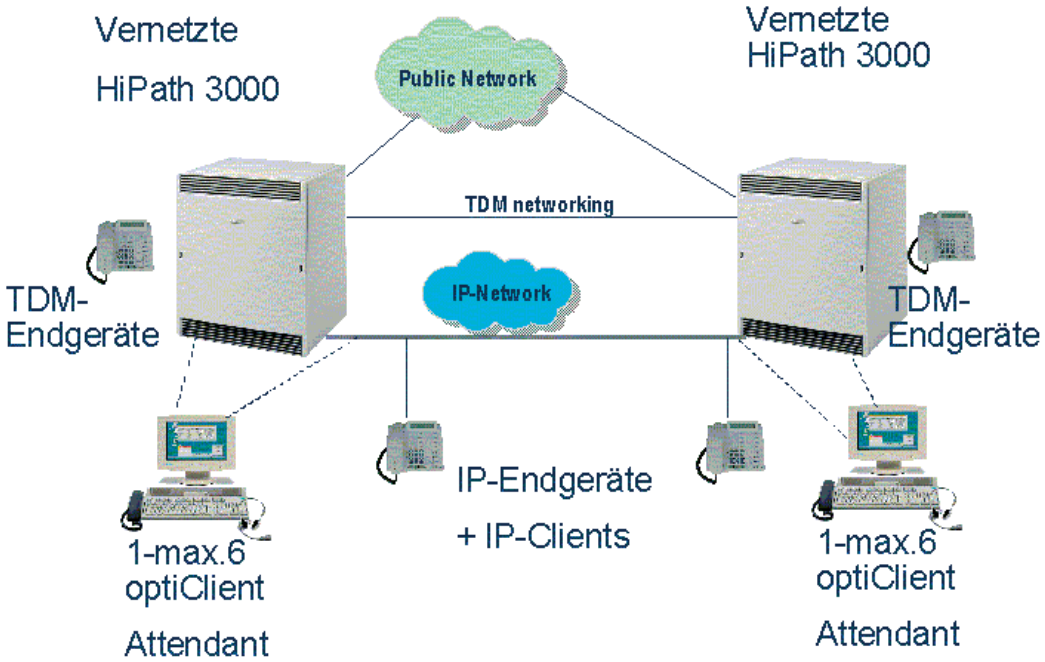
The optiClient Attendant can be used as a central attendant console throughout an IP network (max. 6 optiClient Attendants per network). The attendant consoles must be connected to one of the network's HiPath 3000 nodes, or registered, to enable network-wide BLF functionality. This functionality is independent of the optiClient Attendant connection type. (IP, UP0E or USB). For network-wide BLF functionality, all decentralized systems send their station status information (e.g. free, busy) to the central system on which the optiClient Attendant(s) is (are) connected (signaling in Cornet IP protocol).

In an IP network, a maximum of 100 stations per node can be defined that send their status information to the central optiClient Attendant for display on the busy lamp field. All stations on the central node can be displayed on the BLF.

The optiClient Attendant's control of network-wide busy signaling is independent of the network-wide busy signaling to workpoints by the HiPath 5000 Presence Manager.



Each HiPath 3000 has its own BLF functionality; it receives no BLF information from other HiPath 3000 systems.



7.9.3 optiPoint Attendant

Definition

Switching services can be performed in HiPath 3000/5000 using a specially configured telephone. This optiPoint Attendant (AC) also serves as an intercept position at the same time. At the AC all calls accumulate if there is no direct inward dialing option, or if a station could not be contacted using the call allocation algorithm in Call Management (intercept). The operator then forwards the incoming calls to the relevant stations.

The system telephones optiset E standard, optiset E advance plus/comfort, optiset E advance conference/conference, optiset E memory, optiPoint 500 basic, optiPoint 500 standard and optiPoint 500 advance can be configured as a optiPoint Attendant system.

The function keys of the system telephone used for optiPoint Attendant are preset as follows and can be changed by the service technician if necessary:

- Night answer (switches night answer on/off)
- Telephone directory (opens the internal telephone directory)
- Held calls (provides information on the number of held calls)
- Busy override (goes into a busy connection)
- Hold (puts a party on hold)
- External 1 (first external call, incoming/outgoing)
- External 2 (second external call, incoming/outgoing)
- Disconnect (disconnect or connect a call)

Depending on the individual customer's requirements, optiPoint Attendant can be equipped with key modules and/or with busy lamp fields (optiPoint BLF). The number of function keys (particularly the internal name keys) is increased accordingly (Table 7-3).

Total number of keys	**16**	**32**	**48**	**64**	**90**	**106**	**122**	**180**	**196**	**212**
Number of key modules	1	2	3	4	–	1	2	–	1	2
Keys on key modules	16	32	48	64	–	16	32	–	16	32
Number of BLFs (optiPoint BLF)	–	–	–	–	1	1	1	2	2	2
Keys on BLFs (optiPoint BLF)	–	–	–	–	90	90	90	180	180	180

Table 7-3 optiPoint Attendant - Function key totals for additional key modules and BLFs

When a total of 2 key modules and 2 optiPoint BLFs are connected up a maximum of 212 internal name keys (with internal station number) with busy lamp indicator can be shown.

8 Applications

8.1 Overview

The scope of HiPath 3000/5000 systems can be extended by connecting additional applications. These include products for automatic call distribution (ACD), hotel applications, voice messaging services, call charge computing, video conferences, and mobile communication.

HiPath 3000/5000 and applications running on host computers (plus products) can communication over

- the V.24 application interface (CSTA protocol, 19200 bauds)
  - plus products that support the CSTA protocol standardized by ECMA can be connected directly (for example, Hicom Agentline Office V1.1 CSTA).
- an S_0 interface (ISDN/USBS) configured as a station
- an ISDN adapter (TA S_0) (ISDN/USBS)
- the LAN interface (Ethernet)
  for details, see Chapter 4.
- the PSTN interface
  for details, see Chapter 4.

HiPath 3000/5000 supports CSTA Phase II and CSTA Phase III.
The application connected decides whether to use CSTA Phase II or Phase 3 III during connection setup.

8.2 List of Approved Applications

Application Name	Version	Standalone on HiPath 3000 V6.0	HiPath 3000 V6.0 with HiPath 5000 RSM	HiPath 3000 V6.0 with HiPath 5000 RSM and PC CS
eCRM applications				
HiPath ProCenter E/S/A V5.1	V5.1	X	X	X
HiPath ProCenter Agile V6.0	V6.0			
HiPath ProCenter Agile Standard V6.5	V6.5		X	X
HiPath ProCenter Office V1.3	V1.3		X	X
HiPath ProCenter Compact V2.0	V2.0	X		
Mobile Office				
HiPath ComResponse V1.0 (SMR 1)	V1.0 (SMR 1)	X	X	X
HiPath ComAssistant V1.0	V1.0	X	X	X
HiPath Xpressions (HiPath Xpressions V3.0/HiPath Xpressions V4.0)	V3.0	X	X	X
HiPath Xpressions (HiPath Xpressions V3.0/HiPath Xpressions V4.0)	V4.0	X	X	X
HiPath Xpressions Compact V2.0	V2.0	X	X	X
Phone Mail LDN (Long Distance Network)	Release 6.4	X	X	X
HiPath SimplyPhone for Outlook (see Section 8.12)	V3.1	X	X	X
HiPath SimplyPhone for Notes (see Section 8.12)	V3.1	X	X	X
HiPath SimplyPhone for Notes (see Section 8.12)	V4.0	X	X	X
Smartset 2000 V3.0 (Level 1/2)	V3.0 (level 1/2)	X		
Smartset BLF		X	X	

Vertical applications				
HiPath Hospitality Service Center Compact V2.0	V2.0	X	X	X
HiPath Hospitality Service Center Business V2.0	V2.0	X	X	X
HiPath Hotel Standard V4.1	V4.1		X	
HiPath Hotel Advanced V4.2	V4.2		X	
Management applications				
HiPath Accounting Management V2.0	V2.0	X	X	X
HiPath User Management V1.0	V1.0	X		
HiPath Fault Management V3.0	V3.0	X	X	X
TeleData Office V3.0	V3.0	X	X	X
Middleware				
HiPath TAPI 120 V2.0	V2.0	X	X	X
HiPath TAPI 170 V2.0	V2.0	X	X	X
CAP TAPI Service Provider	V3.0	X	X	X

You can access the current list of approved plus products/applications via the HiPath Ready solution portal on the intranet:

https://partnerdialog.siemens.com/content/storyshow.php?CatID=495&NewsID=1676&lang=de

or

http://vd-infochannel.icn.siemens.de/cfdocs/loesungen/loesungen.cfm

Release dates, national releases and other details can be found in the relevant product-specific sales information or is available from product management.

8.3 HiPath ProCenter E/S/A V5.1

HiPath ProCenter Entry V5.1

Siemens HiPath™ ProCenter® Entry is a solution that provides all the tools needed for perfect customer relationship maintenance and lets you add agents, media or locations as required and without difficulty to your contact center in addition to increasing agent mobility.

HiPath ProCenter Entry features, such as, skill-based routing and comprehensive report generation lead to greater customer satisfaction, increased profitability, and better employee retention - now and in future.

- Intelligent customer forwarding to optimum agents
- Real-time overview of contact center processes and comprehensive reporting
- Optimum alignment of agent competence with customer requirements for more job satisfaction

The best agent for your customer
Siemens HiPath ProCenter Entry performs intelligent skill-based routing. A highly qualified staff group ideally suited to meeting the individual requirements of your customers is automatically created on the basis of defined contact profiles, a database of agent skills, and virtual group functions.

Contact profile
Several requirements that increase routing efficiency are identified for every incoming customer call. These are obtained from several sources: information about the calling party (ANI), dialed numbers (DNIS), voice-based dialing, data input in an interactive voice response system, and information from the customer database.

Agent skills database
All agent skills are stored in the skills database. The skills are used as a guide when choosing the most suitable agent for the defined customer profile. Skills are used to describe agent know-how, training, characteristics or transaction-based experience. You can use this feature to add new training courses to the staff descriptions and therefore also ascertain when further training is needed. At the same time, you can ensure that the relevant agents are not required to process calls beyond their capability.

Virtual group
A virtual call-specific group is automatically created to set up contact with a suitable agent. The agents assigned to this group are fully qualified to handle the special requirements of the customer. The virtual group can also be dynamically redefined depending on the age of the call or the real-time performance requirements of the contact center so that service quality remains at optimum levels. The transaction type can also be used to link priority levels so that important customers get the highest level of attention and service.

HiPath ProCenter Standard and Advanced V5.1

No matter how your customers choose to contact you, they always expect the same levels of service and individual support on the telephone. They expect you to demonstrate real-time familiarity with all previous contacts - irrespective of the media used.

How can these different communication channels be integrated in a unique infrastructure for a contact center? The solution is called HiPath™ ProCenter® Standard and Advanced.

- Forwarding customers to the best-qualified agent over random channels or media
- More effective use of resources in customer interaction in all channels
- Integration of contact center, CRM, and e-business applications

HiPath ProCenter helps you to integrate new media into your contact center's workflow. Multimedia integration in turn lets your company perform real electronic Customer Relationship Management (eCRM). CRM helps to optimize development, control, and assessment of your customer relationships and at the same time increase profitability.

8.4 HiPath ProCenter Agile V6.0

HiPath ProCenter Agile was designed with the concrete objective of developing a comprehensive and immediately executable solution that was easy to operate, configure, and expand in response to changing requirements.

Agile delivers intelligent call routing, diagram reporting, and innovative productivity tools, both for agents and for managers – and all this with a whole new level of user-friendliness.

Small and medium-sized companies and 'informal' call centers can now enjoy the benefits of a multi-functional solution at a fair price.

Siemens delivers a cost-effective solution with the following features:

- complete packet with a wide-range of intuitive options
- rational implementation without expensive special services
- presence and cooperation tools for optimum utilization of corporate know-how so that all issues raised by a customer are dealt with in full during the very first call
- Intuitive, 'idiot-proof' management programs that guarantee effective strategy planning for call routing

Your customers benefit from more efficient and more effective customer service.

The agents are more satisfied and productive because they are working at an integrated desktop that has everything they need for top-level customer service. Managers will be impressed by faster call processing speeds and higher agent productivity and will value the greater level of clarity in terms of work procedures provided by adaptable real-time and historical reporting.

These components are very easy to implement using a visual workflow designer because this tool automatically has full control over the call processing item you assembled with drag-and-drop operations and your routing concept.

The report center provides an engine that is powerful yet easy to adapt for defining and displaying a practical, unlimited number of real-time and historical reports.

Real-time and cumulated views are constantly updated and contain key data, such as, agent workload, service levels, abandon rates, and average talktime. These reports and views can be output in a multitude of graphical and table formats.

An integrated analytical model uses real data trends to forecast call patterns and traffic in real time. This allows for more precise planning of personal requirements and call routing.

Limits and notifications can be configured without difficulty to visually or acoustically inform the manager when set operating parameters are exceeded.

For historical reporting, views can be created quickly and easily by selecting data elements and report parameters with simple point-and-click operations.

Reports can be planned and, depending on requirements, displayed, printed or exported, for example, in Excel, HTML or PDF formats.

Detailed and comprehensible activity logs are even available to examine the step-by-step progress of a random customer call or to trace the details of the work of a particular agent over an entire day.

The Report Center offers an unbelievable amount of information about how your contact center works. The wide range of functions available in this flexible and adaptable tools makes it easier to monitor operations and reach decisions. In addition, the Report Center helps agents to proactively detect patterns so that they can respond to a situation before it becomes a problem.

For agents

The **Agent** Desktop offers tools and information for improved call processing and significantly boosts the quality of customer service. The features include:

- Intuitive, flexible interface that supports simple alignment to random formats and styles.
- Practical screen elements and toolbars based on the "Disconnect and park" principle.
- Real-time streaming for statistics and personal performance data.
- Visual indication of waiting contacts.
- Wide-ranging control elements and tools for call management, including speed dialing, directory, and contact log.
- Automatic pop-up window with customer and call data that is synchronized when an appropriate call is received on the desktop.

- Interface to CRM systems (own and third-party vendors) to automate customer data retrieval on the agent screen.
- Availability status and wrap-up reasons with report option.
- Compact mode that reduces the screen output to an icon on the taskbar.
- Agents can also access the "Teamlist" feature to ensure that all issues raised by a customer contacts are dealt with in full during the first call. This feature displays the presence and availability of co-workers, superiors or experts outside the contact center in real time - with a simple mouse click.

For managers

HiPath ProCenter Agile features a standardized Manager Desktop, a flexible interface, and a familiar Outlook-based screen layout. Planning and configuration are easier to perform with an integrated tool for all administration tasks.

The **Manager** Desktop encompasses the following activity centers:

- The *Administration Center* is used to define users, groups, queues, and devices. With predefined, editable profiles and appropriate classes of service, the configuration of system users and resources is child's play. Call-specific wrap-up and availability reasons are also configured here.
- In the *Broadcast Center*, views and real-time statistics are defined for filtering purposes, representation on wallboards or streaming transmission to the Agent Desktops. You can quickly define your own business rules, limits and display parameters for immediate implementation with simple point-and-click operations.
- The *Design Center* is a powerful program with configurable and reusable components that can be used in intelligent routing concepts, schedules, call processing, and queues.

8.5 HiPath ProCenter Agile Standard V6.5

HiPath™ ProCenter© Agile offers small and medium-sized companies as well as "unofficial" call centers with up to 150 agents a cost-effective, high-performance solution with the following features:

- Intuitive Agent Desktops for the efficient processing of voice and e-mail interaction
- Unique presence and cooperation tool for increasing the initial contact resolution rate
- Advanced visual display tools for optimum contact center design, supervision, and reporting
- Intelligent, group-based routing and call processing, including optional basic IVR
- Rational implementation for rapid, simple, and cost-effective application

Companies are nowadays under increasing pressure to meet growing customers' demands for higher levels of service. Routing, customer contact processing and administration are of key importance to offering excellent customer service and increasing customer loyalty.

At the same time, you want to ensure that your agents have the necessary tools to efficiently process contacts at all customer interaction interfaces. Your managers should also be issued with user-friendly tools so that they can guarantee top-quality customer service and optimum staff productivity.

Presence and cooperation in the contact center

HiPath ProCenter Agile satisfies not only the daily requirements of your contact center manager and agents, it also delivers unique presence and cooperation tools. You can use these tools to increase the initial contact resolution rate. These tools also make it easier to expand the customer service team beyond the limits of the contact center and involve experts from other corporate divisions in the process of problem resolution.

The HiPath ProCenter Agile Agent Desktop supplies contact processors with real-time data on co-worker presence and availability, irrespective of their current location – even for external users or those operating from home.

Experts, managers or specialists from the entire company can use the function-optimized Associate Desktop to advertise their skills to assist in resolving a customer problem.

Simplified contact center administration

HiPath ProCenter Agile features a standardized Manager Desktop with a flexible interface based on the familiar Outlook screen layout. Thanks to the Manager Desktop, all administrative functions can be designed and configured quickly and easily with a single integrated tool.

The **Manager Desktop** features the following work centers:

Users, groups, and resources can be defined in the **Administration Center**. User creation is simplified with predefined, editable profiles and appropriate classes of service. With profiles you can also control which contacts are processed by every user: voice, e-mail, callback or a combination of these media.

Agents can be assigned multiple groups (up to ten) for the simplified configuration of individual groups or for more complex contact editing strategies.

Views and real-time statistics for voice and e-mail can be defined in the **Broadcast Center** before being filtered and shown on wallboards and plasma display panels linked to the client or transferred by means of streaming to Agent Desktops. Business rules, limits, and display parameters can be quickly defined for immediate use with simple point-and-click operations.

The **Design Center** features configurable, reusable components for use in intelligent group-based routing concept and queue process sequences for voice and e-mail interaction. All incoming voice and e-mail contacts are analyzed, categorized, and forwarded on the basis of these sequences.

The Design Editor - a visual, workflow-based tool - automatically examines and validates your strategies in the course of creation.

The **Call Director**, HiPath ProCenter Agile's basic IVR unit, is fully integrated in the Design Center. Managers can use the Design Editor's practical drag-and-drop interface to generate intelligent "frond-end" call processing sequences.

Interactive components, such as

- call menu prompt
- digit entry via caller input
- read/write access to external databases
- "numbers-to-speech" playback

deliver a basic self-service functionality and provide for the interactive front-end processing of incoming calls without complicated and expensive IVR integration.

A component for reading and writing data in external databases simplifies the use of existing customer data for data-driven routing and makes it easier to collect new customer data.

Managers can also easily configure conditional routing concepts based on real-time measurements, such as, the current service level, the average waiting time or schedules for routing after close of business.

The preinstalled Microsoft CRM integration uses contact center data, such as, the caller's telephone number or dialed digits, for example, a customer number, for the automatic retrieval of customer files in the Microsoft CRM desktop. As this feature is fully integrated in the Design Center, no special services are required.

The **Report Center** features a high-performance reporting module for defining and displaying a practically unlimited number of real-time, summation, and historical reports for all media. You can edit and modify reports without difficulty over this flexible interface, without needing an external Report Writer tool.

The Report Center provides detailed views of your contact center operations and makes it easier to monitor operations and reach decisions. It also gives you the skills to proactively detect and respond to patterns – before they turn into problems.

Real-time and summation reports

Real-time and summation views are constantly updated and contain important data, such as, agent workload, service levels, abandon rates, and average processing time for voice and e-mail interaction.

An integrated analysis model uses current data trends to forecast patterns and contact traffic in real time and in this way makes it easier to reach decisions on human resources or contact forwarding.

Limits and alarms can easily be programmed to send a manager an acoustic or visual signal when set operating measurements are exceeded.

Activity logs

Using detailed, traceable activity logs, managers can examine the step-by-step sequence of a customer contact or check the detailed activities of an agent during the day for voice, e-mail, and callback contacts.

Historical reporting

Comprehensive historical reports can be configured quickly by selecting data elements and report parameters with simple point-and-click operations.

The Report Center generates historical reports with diagram and table views.

The report output can be planned, where necessary, printed or in exported in formats, such as, Excel, HTML, PDF or text.

Agent tools for top-level customer service

The media-integrated **Agent Desktop** provides tools and information to effectively process voice and e-mail interaction and at the same time improve the quality of customer service.

The Desktop features include

- an intuitive standardized interface for processing voice, e-mail, and callback interaction,
- unique presence and cooperation tool for increasing the initial contact resolution rate
- a user-friendly feature for "detaching and anchoring" screen elements and toolbars,
- real-time statistics and personal performance data via streaming,
- a visual indication of waiting contacts for incoming calls, e-mails, and callbacks,
- report-based availability status and wrap-up reasons
- an "icon mode" display option that uses taskbar icons to keep the screen free.

Voice and callback processing

A complete set of telephony control elements and tools optimizes the processing of inbound calls as well as agent- and Web-initiated callback interaction.

All inbound interaction is signaled to the agent by a pop-up window on the desktop containing customer data and contact details.

An interface to third-party or internal CRM systems can also be used for the automatic retrieval of customer files for presentation on the agent’s display.

Presence and cooperation tools

Agents can use the Teamlist and Teambar functions to further improve the initial contact resolution rate and response time. They are used to display the real-time presence and availability statuses of co-workers, managers or even experts outside the contact center. Detailed presence information is displayed for all media so that the agents can easily find the most suitable partner for cooperation in voice and e-mail contacts.

Available users can be included in the call processing operation with the forwarding, consultation hold or conference function by simply clicking the relevant parties.

E-mail processing

The Agent Desktop offers tools to effectively process inbound and agent-initiated e-mail interaction. Incoming e-mail contacts are displayed in a pop-up window.
Functions are available for internal and external forwarding and consultation hold to improve the response time and speed up contact resolution.

Agents can proactively address customers by initiating new e-mails. Agent-initiated e-mails and the associated replies can be tracked and displayed in reports to assess the success of e-mail campaigns or the reactivation of customer relationships.

Information sent via e-mail to a caller is monitored and recorded in reports. This improves the quality of customer service and reduces the need for follow-up activities by the agents.

Various different search criteria can be used in the e-mail history program to trace the progress of interaction and to search existing e-mail threads. Agents and managers can then create a sequence of interactions that help to achieve an appropriate solution.

8.6 HiPath ProCenter Office V1.3

HiPath ProCenter Office V1.3 is a standardized solution for call centers in small and medium-sized companies. All communication processes can be individually customized and optimized for corporate workflows.

HiPath ProCenter Office comes with all the necessary interfaces for integration in the customer's existing EDP environment. This means that callers can be identified, for example, on the basis of their call number and customer-specific data can be displayed on the call center workstation's monitor.

Features

Call distribution

HiPath ProCenter Office offers both group-based and skill-based routing (optional). Both routing mechanisms can also be combined with classical distribution list criteria (linear, cyclical, longest-idle, time-based).

CTI/outbound/campaigns

Specific interfaces are available for CTI functions:

- Tray bar displays information on the status of the other agent.
- Tray phone shows a history window with an overview of inbound and outbound calls.

Both interfaces can be used for dialing operations.

CTI platforms, such as, the DDE interface and TAPI First-Party driver, are available for integration in the EDP environment as well as for corporate processes. These platforms support caller identification based on the call number and customer-specific data display on the call center workstation's monitor (for example, screen pop-up with customer history).

Campaigns can still be planned and performed via the supervisors and the agents. Campaigns are allocated in accordance with predefined criteria and priorities.

Outbound/dialing functions are available for performing telephone campaigns. Dialing lists can be used to perform customer queries at scheduled times, for example, and to draw conclusions about lost calls.

Agent workstation

Agents have two tools at their disposal: The telephone and the PC. The telephone, preferably optiPoint 400/500 with display, is used for voice connections and shows the agent status, group assignments, waiting calls, and the call status. optiClient 130 V2.0 or later and analog devices are also supported.

The remote agent logs onto the system by telephone and can specify his or her status by entering a code (DTMF tone dialing).

LAN access is required for using a client PC.

Supervisor/administrator

The supervisor or administrator logs onto the system and is automatically assigned his or her predefined rights. The user interface can be customized.

The information provided about agents, groups, reporting, queues, service level, and alarm messages allows the supervisor or administrator to play an active role in call center communication processes.

Queues

Integrated queues are used for initial, interim, or final announcements. The supervisor/administrator can modify queue sizes and announcements.

Wallboard

ACD information is displayed in real time on the wallboards. This gives the user a group-specific overview, for example, of queued calls, service level, and available agents.

Security

User identification prevents unauthorized persons from accessing corporate HiPath ProCenter Office data. Special measures are needed for additional security mechanisms, such as, a firewall within a customer LAN.

Unified Messaging

This functionality is implemented in combination with HiPath Xpressions V3.0 (Step 2).

HiPath ProCenter Office offers ACD users
voicemail, faxmail, e-mail and SMS messaging functions.

Inbound messages are distributed to agents or agent groups on the basis of defined priorities and volumes. Unified Messaging is operated via a separate messaging client and, in the case of voicemail, a telephone operation function.

An option is available for embedding the messaging functions in MS Outlook® or Lotus Notes.

Technical specifications

- Connection of HiPath ProCenter Office V1.3 to HiPath 35x0, 37x0 version 3.0 or later

- Group-based routing in up to 30 groups or skill-based routing with up to 20 skills, each with 100 priorities per agent
- Eight supervisors/administrators
- Connection of up to 30 wallboards
- Integrated ACD queues with multiple simultaneous announcements for up to 20 callers bundled for each channel
- 64 agents
- Optional integration of messaging applications in MS Exchange 5.5 and 2000 or Lotus Notes 4 V4.6 or later and Lotus Notes 5 V5.08 or later
- CTI with information and dial functions over the PC using Windows-based user interfaces (connection of CTI software possible via TAPI Third Party)
- Integration in existing databases via DDE and TAPI First Party
- Statistics for evaluating communication processes
- Minimum server PC requirements:
  Intel Pentium III with 650 MHz and 512 MB RAM, PS/2 mouse and keyboard, 9 GB hard disk, 3.5-inch FD (1.44 MB), CD-ROM drive, LAN adapter: 10/100 Mbps Ethernet (TCP/IP protocol), 17-inch SVGA color monitor, Windows 2000 Server with Service Pack 2 or higher (subject to market changes)
- Remote service including security logon

8.7 HiPath ProCenter Compact V2.0

Medium-sized companies are increasingly calling for options in the simple ACD solutions segment to visualize and evaluate customer call behavior.

For HiPath 3000/5000, HiPath ProCenter Compact represents a professional, cost-effective call-center application that extends the integrated uniform call distribution (UCD) service to include

- supervisor station with real-time reporting
- statistics
- wallboards

for up to 64 active agents.

HiPath ProCenter Compact is operated on a standard PC under Microsoft Windows NT 4 Workstation, 2000 Professional or XP.

HiPath ProCenter Compact is a multi-user application that assigns each user individual rights to use the application and evaluate recorded data.

The integrated administration interface permits the user-friendly configuration of users, classes of service, reports, licenses, etc. A special database backup feature is used to protect customer-specific data on the PC against unauthorized evaluation.

Statutory provisions involving data capture and evaluations and subject to the co-determination act are satisfied by implementing a second password for the administration of this data.

8.8 HiPath ComResponse V1.0 (SMR 1)

The HiPath ComResponse voice application platform translates Web pages into voice data and thus makes Web content accessible to telephone users.
HiPath ComResponse uses the advantages of the Web to process dynamic voice processing requirements made by customers and employees. It is easy to configure and supports the configuration of individual applications with conventional Web-editing tools, such as, Microsoft Word.

The voice application platform HiPath ComResponse offers three application packages:

- **Auto Answering**: this is a cost-effective and dynamic package for automatic call acceptance with the following functions: Intelligent Announcement, Auto Attendant (DTMF) and Music-on-Hold.
- **Web IVR**: this provides the Web-based interactive voice dialog system function for customers of the "HiPath ProCenter Suite Contact Center" solution.
- **Portal**: this combines the HiPath ComResponse platform with professional services and in this way supports individual draft applications for customer-specific requirements.

The Auto Answering and Web IVR application packages are particularly attractive to all companies that want to benefit from the convenience and cost-savings offered by internal configuration and modification options. Companies that do not have any in-house technology experts and that frequently change their customer interfaces can benefit from the simple configuration and administration options offered by the HiPath ComResponse packages.

In addition to the features that are already available as part of the Auto Answering and Web IVR application packages, the Portal package provides an exceptionally flexible platform for the development of voice applications used to provide an almost unlimited range of individual voice-capable solutions. HiPath services can be used to customize applications and configure them for voice control or telephone access based on DTMF telephones. In conjunction with Microsoft Outlook Calendars, customers can use this function, for example, to plan meetings with sales representatives or manage electronically saved documents, such as, brochures and product information, that were sent via e-mail or fax.

In the same way, mobile knowledge workers can use their mobile telephones to access a wide range of company resources, such as, Microsoft Outlook systems, folders distributed company-wide or electronically saved documents.

Features

- Music-on-Hold
- Intelligent Announcement
- Auto Attendant
- Access to saved information over voice commands or DTMF-driven navigation
- Voice recognition in German and English
- Text-to-speech conversion in German and English
- Simple IVR functionality:
  - Front-end menus
  - Announcements, such as, queue position or estimated waiting time
  - Digit entry for identification purposes
- Turnkey delivery options
  (pure software solution and preinstalled server)

Technical specifications

- Based on standard TAPI and SAPI interfaces:
  - TAPI for telephony applications
  - SAPI for text-to-speech conversion and voice recognition

- Supports analog connections (T/R) over VMIs for connection to the communication platform
- PC-based solution with scalability for up to 30 ports per system
- More complex installations integrate multiple systems in a central network
- User interface in English and German
- Supports the integration of additional language components over the TAPI-interface

8.9 HiPath ComAssistant V1.0

ComAssistant is a server-based CTI solution for the intranet. Software installation and configuration are performed centrally on the server. User-specific journal data and settings are saved on this server. This totally eliminates the need for client installations. It ensures fast and simple distribution on the intranet.

As the function is offered via HTML pages and HTTP requests, all you need is a Web browser to use ComAssistant from any computer in the intranet.

Even if the user's PC is deactivated, all journal information relevant to him or her is displayed on the server.

User data backup is performed centrally.

In addition to a key option for integrating the telephony function in own Web pages using HTTP requests, ComAssistant delivers a standard user interface with which all functions can be used.

ComAssistant Rules is the ComAssistant component that performs rule definition and interpretation.

ComAssistant Rules extends the ComAssistant CTI, Exchange (Outlook) or Lotus Notes/Domino functionality to include rules/rule sets for forwarding calls or e-mails and supports user-friendly voice connection.

ComAssistant Rules lets you schedule call forwarding - depending on the importance of the caller - either to the voice info system or the mobile telephone and execute it at a specified time.

ComAssistant consists of four components:

- **ComAssistant CTI**
  HiPath ComAssistant CTI is a server-driven application that delivers Web-based telephony functionality on the intranet. HiPath ComAssistant CTI is ideally suited for the integration of CTI in existing intranet solutions.

- **ComAssistant Rules**
  ComAssistant extends the function of ComAssistant CTI, Exchange (Outlook) or Lotus Notes/Domino to include rules/rule sets for forwarding calls or e-mails and supports user-friendly voice connection.
- **ComAssistant DB**
  ComAssistant DB is the database for ComAssistant. It is installed as a component of ComAssistant Rules and is the basis for all user-specific data.
- **ComAssistant Group**
  ComAssistant Group is the groupware component in ComAssistant.
  This add-on component provides connections for Lotus and Exchange. It must be installed on the groupware computer and run on the Lotus or Exchange Server.

8.10 HiPath Xpressions (HiPath Xpressions V3.0/HiPath Xpressions V4.0)

HiPath Xpressions provides user support for the daily exchange of voice, fax, and e-mail information.

The current location of the user is of no importance here. Flexible telephone- or PC-based access means that you can operate **HiPath Xpressions** in the office, from home (for example, as a teleworker) or when travelling (on business trips, at the customer facility, etc.). Groups of persons who mainly communication with mobile telephones can use SMS texts (Short Message Service) to keep abreast of new messages, have SMS messages sent to their mobile telephone and access all voice, fax, and e-mail messages. **HiPath Xpressions** delivers a flexible solution for all user groups in the company.

HiPath Xpressions combines the services

- voicemail,
- faxmail,
- e-mail, and
- SMS

on a Windows2000/2003 platform to form a unified messaging system. Thanks to its modular, scalable client/server architecture, this solution can be dimensioned to suit the individual communication requirements of your customers. Investment protection for the future is already guaranteed by open standards, integration in existing EDP and telecommunication environments, universal access to messages via PC and telephone, and secure access via ISDN, LAN, and intranet/Internet. You can select requirements-based services, user packages, EDP integrations, and software-only solutions. From small starter packages to networked communication solutions, there is always a HiPath solution tailored to suit the customer's needs.

HiPath Xpressions is mobile and makes users mobile. This solution lets you configure a separate mailbox for each of your employees. An inbound message received can be signaled not only on the PC but also, if required, at any workstation-based telephone or mobile telephone. The message can be retrieved on the office PC, at home or in a hotel. For the home office to work smoothly, it is also vital that the teleworker has constant access to corporate resources. This is not a problem with **HiPath Xpressions**.

Your customers can use the Fax-on-Demand supplementary feature at any time, day or night, to retrieve information, such as, current prices, product data, market or weather forecasts. This service allows clever companies to save or even make money.

Unified Messaging

Unified Messaging refers to the integration of voice, fax, e-mail, and SMS services. All personal messages are available for retrieval in a user-specific mailbox. The Internet-oriented function lets you access all IMAP4 clients from your PC (for example, Netscape Communicator or Outlook 2000/XP/2003). No need, therefore, to abandon your familiar user interface. You can operate your mailbox very easily over the telephone when on the road.

Unified Messaging is especially attractive to companies that have not yet installed an e-mail system. It means they can avoid this separate investment without foregoing the benefits of a powerful and Internet-capable e-mail component.

The services are also easy to integrate in your existing communication environment. Optimized versions are available for MS Exchange, Lotus Notes, and SAP R/3 (see information on EDP integrations).

Faxmail and fax applications

All subscribers have a personal, cross-service mailbox with their own DID number for sending and receiving fax messages. This mailbox is password-protected to prevent unauthorized access.

Fax receipt
Fax messages that are addressed to a subscriber's fax number are saved in the subscribers mailbox where they can be retrieved or edited further.

Automatic fax tone recognition
If call forwarding is active at the workstation telephone, **HiPath Xpressions** uses the typical function implemented by analog all-in-one telephone/fax machines to check if the call is in fact a fax and, where applicable, switches to fax message acceptance mode.

Deputy rule
All inbound messages can be automatically forwarded to another station to guarantee that no messages go unprocessed (for example, during a vacation).

Fax viewer/editor
Incoming fax messages can be displayed and edited on the PC using a default fax viewer/editor for TIFF or JPEG format or are integrated with HiPath Xpressions **Extension for MS Outlook 2000/XP/2003.**

Output on LAN printer
You are not obligated to output inbound fax messages on a fax machine. Instead, you can output them at any time on a LAN printer. The number of fax machines needed in a company can thus be significantly reduced.

Outputting e-mails as faxes
Inbound e-mails and convertible attachments can be output as faxes on a random fax device. This means you always have the latest information, even when on the road.

Archive

Incoming fax messages containing important corporate data, for example, are not only sent to the original recipient. A copy of these messages can also be sent to a separate mailbox (for example, for central archival by an external application).

Fax transmission

- **Fax coversheet and logo**
  You can use a subscriber-specific fax coversheet and logo when sending a fax.
- **Fragmented fax transmission**
  If a fax transmission is interrupted, transmission is resumed from the page on which the interruption occurred. The resumption of an interrupted transmission can be indicated by a configurable marker.
- **Transmission from an MS Office application**
  Fax messages can be generated and sent directly from an MS Office application (for example, MS Word for Windows, MS PowerPoint, etc.).
- **Scheduled transmission**
  The user can specify when a fax should be sent using the priority levels normal, medium, and high. The periods are assigned priorities centrally and equally for all users.

Fax on Demand
Fax documents stored in **HiPath Xpressions** are available for polling as required. Each of the documents provided is assigned a permanent station number. The document is transmitted when this station number is dialed from a fax machine. The caller bears for the connection costs in this type of transmission.

Voicemail

The voicemail application in **HiPath Xpressions** lets every user receive, save, forward, answer, and comment on voice messages. This interface is provided by the telephone or PC. Fax and e-mail messages can also be output via voicemail. Faxes can be forwarded to a printer or a random fax machine. E-mails can be read out (text to speech).

User prompting
Acoustic user prompts guide you through all functions. You can use the Help function to access detailed additional information. When using a digital telephone with Hicom 300 E/300/300 H or HiPath 4000, visual on-screen displays are used to indicate the individual steps in addition to spoken user prompts. You can set the user prompt language at each station for the specified functions. The languages available are: German, British or American English, French, Canadian French, Italian, Portuguese, Brazilian Portuguese, Spanish, American Spanish, Turkish, Russian or Dutch. User prompting is available in these languages with a comparable Hicom PhoneMail or Hicom 300 VMS user interface. Every subscriber can use the administration console to set his or her user interface (if this is available in the system).

For external and internal callers
You can redirect calls to your mailbox when you are absent (meeting, business trip, vacation, etc.). A caller hears your personal announcement and can leave a message for your after the signal tone. This also applies if the subscriber's mailbox limits were reached. If the caller wants to speak directly to another party instead of leaving a message, he or she can set up a connection to a deputy or attendant console, without having to call again.

For mailbox owners
An announcement is added to the user prompts when you enter the access number in **HiPath Xpressions**. You must enter a personal station number and password to output existing messages (voice, fax, e-mail) and to send messages, etc.

Password
All saved messages are password-protected. The user can change this at any time. If you repeatedly enter the wrong password, **HiPath Xpressions** clears down the connection and, in the case of external callers, sets up a connection to the attendant console.

Receiving messages
You specify whether the caller should only hear an advisory (advisory function) when you are absent or whether the caller can to leave a message after an announcement (answering machine function).

Visual and acoustic signaling
New inbound messages are visually signaled on digital telephones with display by the illuminated mailbox LED and by an announcement when you lift the handset. When you press the mailbox key on digital telephones connected to Hicom 300 E/300/HiPath 4000, a message signals the existence of a message in **HiPath Xpressions**.

In analog and digital telephones without display, you only hear an acoustic signal. You can retrieve messages by accessing your mailbox in the usual manner.

Notification service
You can arrange for new messages to be signaled by SMS. Every subscriber is free to configure this on a service-specific basis. Voicemail, faxmail, and e-mail are therefore signaled by a short message on your mobile telephone. These settings can be modified at any time at the telephone or via the user-friendly Web Administration client.

Listening to messages
You can play back messages saved on your telephone at any time and anywhere by dialing your mailbox. You can perform fast-forward or rewind operations within a message or insert a pause.

HiPath Xpressions makes a distinction between the various services, such as

- voicemail
- faxmail
- e-mail

as well as the following message queues:

- incoming or undeliverable messages,
- new messages,
- messages that have already been played back,
- messages sent after the **HiPath Xpressions** connection is ended.

If there is more than one message, you can scroll back and forth until find a particular message. You can select your voice message in your **HiPath Xpressions** mailbox on your PC and output it via the built-in loudspeakers.

Answering/forwarding messages

You can delete, save or edit a message once you have played it back. You can therefore record your answer to an internal subscriber's question on his or her mailbox without having to redial his or her station number or set up a direct connection to the internal or external sender. The message can also be forwarded to another mailbox owner with a comment. Messages with comments can also be forwarded with comments.

This function is available on the telephone and PC.

Sending messages

- to a recipient
  You can forward a recorded message to another user's mailbox. This is possible from every location and around the clock.

- to a distribution list
  You can create personal distribution lists on your PC to send messages to a specific circle of recipients. Each distribution list can contain up to 99 station numbers. Central distribution lists can also be configured for all mailbox owners.

Creating messages
A voice message can be recorded and sent not only from the telephone but also from the PC.

Personal announcements/central announcements

- Personal announcement (greeting)
  Every mailbox owner can record his or her personal name announcement; otherwise, the station number of the station dialed is output by default.
  In addition, you can choose between nine personal announcements. The user can assign these personal announcements to the following call situations depending on the time:
  - alternative announcement (used for internal and external callers)
  - announcement for internal callers
  - announcement for external callers
  - announcement on busy

If you did not activate the personal announcement,
the system announcement is used by default and the caller can then leave his or her message.

- Central announcement
  In addition to the personal greetings, you can create central announcements that are valid for all users.

Auto Attendant

The Auto Attendant function is provided to improve customer availability. After listening to the greeting and list of options available, a caller can either select a more qualified contact, set up a direct telephone connection to the selected contact or choose automatic connection to the attendant console.

8.10.1 HiPath Xpressions Compact V2.0

HiPath Xpressions Compact is a system for operating voice mailboxes with different capabilities with the AutoAttendant function (menu-driven call processing). The system is designed as a plug-in card for operation in Hicom 150/HiPath 3000 communication systems. System administration is performed with HiPath 3000 Manager C or HiPath 3000 Manager E.

Version 6.0 features the following individual functions:

- Depending on the Version 6.0 system type and product variant, up to 8 or 24 ports, that is, up to 8 or 24 parallel attendant console and answering machine operations.

- 100 hours voice recording capacity.
- Two telephone user interfaces; the standard interface corresponds to the interface in version 1.0. The second interface is the Xpressions interface which has the same key layout as the Xpressions V3.0 interface (same key for same function).
- The HiPath 3000 multi-customer function is supported (for example, in incubators with a common telephone system).
- 3/8/20 minutes maximum announcement length per voice mailbox, depending on the mailbox type.
- Scheduled notification call after receiving a new voice message,
  either as a telephone call, as a pager message* or as an SMS* (Short Message Service)
  (DTMF suffix-dialing only)
- Classification of messages, answers and comments as private, urgent, and normal.
- Date and time stamp for every message.
- Distribution of messages to all mailboxes (broadcast) or distribution lists.
- Option for calling back callers who left a message
  (CLIP service necessary).
- Automatic deletion of old voice messages after a preset interval.
- Alternative greetings depending on time of day, call type or calendar.
- AutoAttendant (automatic call pickup, greeting and switching, day/night service). This involves: name-based speed dialing possible for call forwarding.
- Automatic fax tone recognition and forwarding of faxes to a mailbox-specific fax destination.
- Context-sensitive telephone-based mailbox administration by the user.
- Playback of professionally recorded greetings over HiPath 3000 Manager.
- Music on hold with endless loop
  (license required for this feature in HiPath 3000 version 4.5 or later).
- Playback of individual announcements (for example, for internal call distribution (UCD))
  (license required for this feature in HiPath 3000 version 4.5 or later).
- Group mailboxes with up to 20 stations.
- Information mailboxes with 20-minute announcement. Endless playback and navigation possible in the announcement text.

HiPath Xpressions Compact supports a central voicemail functionality in a HiPath 3000/5000 network. All stations can use the central voicemail server. It cannot be used as a central announcement device in a network.

8.11 Phone Mail LDN (Long Distance Network)

HiPath Phone Mail is the user-friendly starter package for the voice messaging product segment.

The key features of HiPath PhoneMail are

- receiving, saving, forwarding, answering, and commenting on voice messages, sending own voice messages to stations
- auto attendant with DTMF suffix-dialing and fax dial tone recognition
- automatic call acceptance/announcements before answering
- automatic info services

8.12 HiPath SimplyPhone for Outlook V3.1 and HiPath SimplyPhone for Notes V3.1 and V4.0

HiPath SimplyPhone is ideally suited for workstations that use Lotus Notes or Outlook 98 as a universal communication and organization tool.

Telephone calls can be saved in Lotus Notes documents. In the case of inbound calls, the calling party is recognized in Lotus Notes/Domino address books or global LDAP address books (MetaDirectory).

Direct calling via menu is possible with entries from Lotus Notes view, personal address books and Domino directories, journal and e-mail databases. It is also possible to search for a station in the personal address book, Domino directory and the global LDAP address books (MetaDirectory), and then choose from the stations found.

HiPath SimplyPhone for Lotus Notes 3.1 is a CTI client based on the Microsoft telephone interface TAPI and can be used with various TAPI Service Providers.

HiPath SimplyPhone for Lotus Notes 3.1 enhances the available Microsoft Outlook 2000 or 98 functions with convenient telephone functions, such as, consultation hold, conference, ring no answer, toggle, call forwarding and the following CTI features:

- Calling entries from Lotus Notes view, personal address books and Domino directories, journal and e-mail databases.
- Caller identification from Lotus Notes personal address books and Domino directories or global LDAP address books (MetaDirectory).

- Call logging in Lotus Notes documents.
- Call planning and callback list in Lotus Notes mail/journal database. E-mail notification in the case of forwarded or transferred calls.

8.13 Smartset 2000 V3.0 (Level 1/2)

Combining the PC and telephone delivers a while new level of quality at the workstation.

To ensure that high customer contact levels are maintained, many companies demand immediate identification and fast inbound call recording.

A clearly laid-out user interface that is quick to install and easy to use is required, especially in environments with high traffic volume, such as, telemarketing, sales and service companies, mail order companies with order processing facilities and secretariats.

- Integration of the PC in the voice and data area.
- Greater competitiveness through the use of these types of application gives us an edge over the competition.
- Smartset 2000's ease of installation and simple operation increases consumer acceptance and trust in solutions of this kind.
- Customer-specific requirements can also be satisfied with flexible solutions and configurations.
- More efficient deployment of staff by easing the workload of workers at the PC workstation.
- This system can be used to evaluate incoming ISDN calls directly at the PC and start appropriate applications automatically. This ensures faster staff responses to inbound calls (for example, automatic indication of customer data sheets).
- Smartset 2000 supports all current Siemens PABXs and needs no additional drivers.
- Smartset is Siemens' oldest and most widely used CTI software application and is constantly updated.

Smartset is a user-friendly PC telephone directory program that runs under Windows 95/98/NT/ Win 2000/XP and provides telephone support (outbound/inbound). All rights to this PC software are reserved by the manufacturer. Smartset can be used to transfer the inbound ISDN number to the PC and search for and display the relevant entry in the telephone directory. The user has the freedom to create different telephone directories (for example, company/private). The telephone directory can also be centrally saved on the PC network. The Outlook telephone directory can be fully integrated in Smartset 2000, that is, there is no need to either export or import the data. If the user searches for an entry in Smartset, Smartset searches its own telephone directories as well as the Outlook Contacts folder and displays all entries found. The user can write an e-mail directly, providing there is an e-mail address available for an entry. If there is a number of different telephone numbers saved for a name, the required number (for

example, company, private, cell phone) can be selected with a right-click. Depending on the incoming ISDN numbers, applications can be started under Windows and customer-specific data sheets can be displayed and then immediately made available for further processing. It goes without saying that Smartset displays all telephone directory and Outlook entries in Smartset for immediate caller identification. Call list and call filter functions offer greater convenience. The function for importing to/exporting from ASCII (CSV) is provided for importing and exporting telephone directory data.

The most important Smartset functions:

- Multiple telephone directories with search criteria
- Dialing from the PC telephone directory
- Automatic activation of the PC file/application
- List of inbound calls
- Management of pending calls
- Caller identification based on address database and Outlook Contacts
- Speed search through the direct entry of names or station numbers
- Twelve different menu languages,
  for direct changeover
- Data connection interface for Office packages
- Macros are included
- Direct access to up to three telephone directories and Outlook
- Unlimited number of repertory keys
- Additional TAPI interface for connecting other programs included
- Sending messages to and receiving messages from the Smartset BLF

8.14 Smartset BLF

Software solution for displaying when telephone users are busy in the customer's IP networks.

- Simple and cost-effective solution for Hicom 150 E Office/HiPath 3000 systems in version 1.0 or later for connecting busy lamp fields over IP. Expansion of the product portfolio and satisfaction of customer requirements as unique selling point.
- Quick information on whether telephones are busy before routing.
- Target groups are small call centers, networked systems, and service provider companies.
- Simple absence information for administration.

Features

- Programmable busy lamp field for all Hicom 150 Office/HiPath 3000 systems in version 1.0 or later with a PC-video interface.
- The number of lamps and stations configured can be freely set up to a maximum of 240 busy lamps per client.
- A customer IP network is required. Several systems can be displayed on a client PC.
- The busy lamps are displayed on a random PC that is available in the customer's network. The only requirement is an IP connection to the server.
- An optiset E telephone with data adapter or an optiPoint 500 telephone with USB is required for the server connection.
- The BLF software runs under the PC operating systems Windows 95, 98, NT or optiClient 130, Windows 2000 or XP.
- There is no minimum configuration requirement for the server PC. This server PC can also be used for any other applications, such as, Microsoft Windows Office.
- Together with Smartset 2000, short messages can be sent to and received from the BLF.

8.15 HiPath Hospitality Service Center Compact V2.0

The HiPath Hospitality Service Center is an intelligent CRM solution that can perfectly simulate and implement service operations in hotels. HHSC was specially developed for the needs of the service-oriented hospitality industry. It is a conceptual breakthrough in the integration of communication services and service control for guests. This innovative solutions helps hotels to reflect their business strategy in consistent guest services and to increase profitability.

Features

- Work process optimization through the integration of telephone switches and software applications
- Intuitive, customized interface for the hospitality industry
- Service tracking to trace customer wishes from request to satisfaction
- Reporting functions for effective personnel management
  (including a more flexible definition of key performance indicators)
- Provision of large volumes of information and statistics for Hotel Management
- Intelligent routing functions to automatically increase capacities during peak hours
- Facility Monitoring and the emergency module for effective facility management and active security
- Service center shared by multiple facilities to maximize savings

8.16 HiPath Hospitality Service Center Business V2.0

See Section 8.16, "HiPath Hospitality Service Center Business V2.0"

8.17 HiPath Hotel Standard V4.1

Communication solution for hotels and residential homes for the elderly

HiPath Hotel Standard is a PC-based hotel solution for small and medium-sized hotels and residential homes for the elderly (serviced apartments with hotel-like character) with up to 250 rooms as standalone or multi-station system. The Windows interface is intuitive and easy to use. In connection with the communication platform, work routines are accelerated, duplicated activities are avoided, and perfect service is guaranteed.

The most important functions of HiPath Hotel Standard:

- Check-in with capture assistant, group check-in
- Check-out with billing assistant

- Relocation function with capture assistant
- Billing assistant for flexible DTMF control of billing
- Printout of guest bill with conversion of the total in additional currencies (for example, euro)
- Generation of interim bills
- Name entry for caller identification
- Telephone charge recording and system evaluation
- Flexible telephone/telephone booth and Cordless assignment
- Automatic wake-up service with wake-up time recording at the telephone and in the front office
- Room status management
- Management of room category prices and day-specific supplement factors
- Management of measurement periods for graphic visualization
- Telephone-based recording of minibar use
- Service booking
- Message administration with automatic control of the message waiting lamp
- Advanced input masks for residential homes for the elderly
- Interface to health insurance billing systems
- Automatic/manual telephone charge billing at the end of the month
- Monthly bill output
- Prepayment

8.18 HiPath Hotel Advanced V4.2

Communication interface for hotel EDP systems

HiPath Hotel Advanced is an intelligent solution that broadens the range of communication platform features available for the hotel's front-office area and therefore increases the interaction between both systems. This reduces staff workloads and increases guest comfort.

HiPath Hotel Advanced is available for all Siemens communication systems.

This solution is also advantageous for F/O-system manufacturers, as it offers a simple, uniform hotel interface. The protocol description is disclosed and made available to every F/O-solution supplier.

This standard hotel interface offers the following features:

- Check-in/check-out with COS activation/deactivation
- Name entry for caller identification
- Call charge calculation
- Wake-up service entry
- Room status entry
- Minibar status entry
- Message receipt (message waiting LED)
- Do not disturb
- Administration of virtual station numbers

Advanced options, such as

- wake-up module
- voicemail module
- fax module
- or special call charge management software

are also integrated.

HiPath Hotel Advanced is intended for hotels that already have a conventional front-office system and want to connect this to a communication system.

8.19 HiPath Accounting Management V2.0

Concept and functions

The need for standardized and simple administration increases as data and voice networks converge and at the same time grow in complexity.

HiPath Management is therefore a key component in the HiPath architecture. It supports HiPath component administration with User Management, calculates and bills communication costs based on use with Accounting Management, increases HiPath component availability and failure tolerance with Fault Management, and offers a wide range of supportive functions to secure the cost-effective operation of communication systems or networks. Transactions can be rapidly processed at any time and from any location thanks to this solution's object-oriented and modular structure and its use of Web browsers and standard interfaces for access, for example, interfaces for Directory Access. This all leads to short response times and lower administration costs. Tasks are executed quickly and without difficulty.

The modular concept guarantees the correct combination of applications and functions for every HiPath network and provides long-terms investment protection for communication infrastructure.

HiPath AM system functions

Collecting Agent
The communication data (CDR Call Detail Records) provided by the individual communication systems in the network is collected by Collecting Agents (HiPath AM components), filtered, and submitted to Accounting Management for further processing.

Data storage/archiving
The communication data is organized in a database as monthly or daily files for better performance.
An archive function can be used to export communication and organization data to disks or streamers for a selected period. You can restore one or more archives for evaluation or research.

User/rights management
Every user can be assigned individual access rights depending his or her tasks. The user IDs are managed with their various classes of service and passwords by the system.

Master data administration in HiPath AM

Access over administrator workstation
Master data which includes organization charts divided into eight hierarchical levels, extensions, cost centers, PIN/account codes, tariffs, and a wide range of other data can be individually configured, modified, and deleted. Similarly, import and synchronization is possible with the HDMS/CM-Win or HiPath 4000 Manager/Assistant data.

Web-based access
Authorized users can use Web Access to configure and edit the organization chart without synchronization with HDMS/CM-Win or HiPath 4000 Manager/Assistant. Classes of service are individually configured for each Web Access user. This allows you to make a clear distinction between those organizations that can be seen and those that can be edited.

HiPath AM system backup
All important activities performed on the system are recorded in a logfile.
A alarm message is signaled if no call data is transferred within a set interval.
A Watchdog tool lets you monitor a wide range of different HiPath AM processes. If one of the monitored processes reports an alarm, you can forward it via e-mail or pager to another person.

Cost and price calculation

Cost/price differentiation
Parallel cost billing is possible for controlling service provider costs and calculating prices for further internal and external charging.

Transfer/individual calculation
Costs/prices can be obtained from the communication system data record or calculated using individual tariff tables (optional). These can be entered with eight decimal places so that even per-second billing prices can be calculated with adequate accuracy.

Export/import of tariff tables
Once defined, tariff tables can be exported and then imported into another installation.

Recalculation
You can recalculate existing connection data for a selectable period with new prices or modified organizational assignments.

Reports

Report layout/filter
The connection data saved can be evaluated using predefined system reports, as well as user-defined and generated own reports in tabular and graphical form.

Report layout can be freely defined or supplemented.
Sophisticated filter functions (period, day/business hours, call types, extensions, and organization units, PIN/account codes and their groups, trunks, cost centers, limits, other CDR fields and attributes) permit the selection of required data.

Report output
Outputs are performed at the printer (local, network), file (local, network, e-mail) and on the screen (preview).
Immediate creation and output, as well as scheduler functions can be initiated.

Web Access

Reporting over the Internet/intranet
Evaluations and reports can be created on the Web with the Web Access application. Classes of service are individually configured for each Web Access user. You can use these classes of service to define which reports and which data each user is permitted to view. Interactive and graphical overview reports can be broken down/zoomed to provide a quick overview and specific evaluations of the required organization units.

8.20 HiPath User Management V1.0

The need for standardized and simple administration increases as data and voice networks converge and at the same time grow in complexity. The HiPath Management applications therefore feature the essential components of the HiPath convergence architecture.

HiPath Management applications provide user-friendly and effective support the wide-ranging management activities available in a HiPath network.

The modular concept, expanded to include additional HiPath Management applications, offers a combination of applications and functions for every HiPath network and thus provides long-term investment protection for the communication infrastructure.

HiPath Accounting Management calculates and bills communication costs on the basis of connection data from the various communication systems in the network and assigns them to causes, irrespective of whether these involve traditional voice or Voice-over-IP connections.

HiPath Fault Management guarantees increased availability and operating security for HiPath components and offers a wide range of other supporting functions to secure the cost-effective operation of communication systems or networks. Additional network components can be integrated in the network-wide monitoring concept.

HiPath QoS Management ensures high data throughput, real-time behavior and fair bandwidth assignment in the network. It monitors the network quality needed for communication. The configuration of the relevant network elements is considerably simplified, network quality monitoring is offered and the entirety is rounded off by service level management. With HiPath QoS Management, your network quality is always under control!

HiPath User Management provides a single-entry point for all relevant user data in a HiPath network and stores the data in central directory.

If user data is input in a corporate directory, it can be automatically transferred to HiPath User Management over configurable workflows so that the single-entry point is also guaranteed for this application.

All HiPath systems and applications that need this data can access it via standard interfaces. The repeated input of identical data can be avoided by centrally storing and administering user data, performing automatic transfer from a corporate directory and automatic database synchronization for all HiPath systems and applications. This also ensures that data is consistent throughout the network.

HiPath User Management not only provides a means for user-friendly maintenance of user data. It can just as easily be used to assign communication resources to and withdraw them from users. Such resources include HiPath telephones and fax machines, Xpressions mailboxes and CTI clients. HiPath User Management does this by sending a job to the relevant element manager, monitoring how the job is performed, and using appropriate icons to indicate all resources available to a user.

HiPath User Management is not only an efficient management tool for user data administration, it can also be used as a HelpDesk application for the HiPath network.

8.21 HiPath Fault Management V3.0

HiPath FM provides ideal support for the primary requirements of failsafe communication.

It does not matter:

- if communication is data- or voice-based,
- which type of infrastructure is used for communication, that is, line, LAN or wireless,
- if terminals, systems, servers or complex solutions, such as, call centers and other applications should be monitored,
- if these are small networks or an international network topology with several hundred standalone systems in different network domains.

HiPath FM signals the first signs of a fault in a clear graphic fault management component with fault priority and location information. It also display a wide range of additional information that can be used for immediate fault correction. And all this long before the network stations notice the effects of interference.

HiPath FM can be used to monitor communication resources even without comprehensive expert know-how using a simple graphical user interface and wide-ranging support functions.

HiPath FM is programmed in Java meaning it runs on almost all conventional operating systems and computer platforms. Internet access with Web browsers guarantee mobility for the user.

HiPath FM thus plays a very significant role in guaranteeing that the communication network operates securely and that your company maintains its competitive edge.

HiPath FM can be integrated via Materna GmbH gateways as well as in the umbrella management systems HP OpenView and IBM Tivoli NetView and in the process management system "Action Request".

System functions

Client/server architecture
The server manages all information and the logged-on clients. It monitors access to the managed objects. The client provides a graphic representation of the information managed in the server.

Client access
Access to the HiPath FM client is possible both with a Java standalone application and Web browsers. As a result, the application can be operated from almost every location.

Single Point of Access (SpoA)
Provides access to the other applications of the individual element managers, for example, to perform configuration changes in the communication systems.

Platform independence
The Java-based HiPath FM software permits operation on a large number of hardware and operating system platforms.

System administration

Managed objects
Once the network elements have been automatically detected in a network domain, you can select which of the elements should be monitored with HiPath FM.
The network elements monitored by HiPath FM are administered in the server as managed objects using selected attributes. Administration covers not only the various network nodes, but also the connections between these.

User administration
User access to the information saved in the server is protected by login and password. The graphic user administration unit simplifies user configuration, modification, and deletion.

Rights management
Every user can be assigned individual access rights depending his or her tasks. Six user profiles with permanently defined rights are predefined for added simplicity.

8.22 TeleData Office V3.0

Cost management for your voice and data communication

Teledata Office version 3.0 can record communication data at the technical source (Hicom®/ HG 1500) or read it in via electronic data exchange (mobile telephony) and calculate the associated costs. The resulting costs for fixed-network, Internet, and mobile communication are encrypted on the basis of the user.

To make sure that this does not incur administration expenses, the user administration component in Teledata Office version 3.0 learns all communication addresses itself. The communication addresses recorded in this way now only have to be assigned to a user.

The circle is thereby closed: professional Internet-age software guarantees provider-independent user data recording and transparency, even in the smallest cost center.

Corporate communications controlling

Controlling starts with examinations. Is the telephone bill correct? Where were the costs incurred? The objectives of cost-effective management are therefore transparency and unique allocation of costs to cause. In addition to ongoing operating costs, the duration and purpose of communication operations are also important. After all, the time spent by the user on communication also costs money.

Communication infrastructure performance is another cost aspect. Every jump to higher bandwidth needed on account of exhausted network load always results in heavy investment in new hardware. A detailed inspection of utilization mitigates the migration pressure and saves costs.

9 Capacities

PARAMETER	System			
	HiPath 3350 HiPath 3300	HiPath 3550 HiPath 3500	HiPath 3750 HiPath 3700	HiPath 3800
Agents				
Agent IDs in system	150	150	150	150
Agents active simultaneously in system	150	150	150	150
Agents active simultaneously on a telephone	1	1	1	1
Total number in system	-	Unlimited		
Toll restriction:				
Number of allowed lists	6	6	6	6
Number of denied lists	6	6	6	6
Allowed list, short (10 entries with 25 digits each)	5	5	5	5
Allowed list, long (100 entries with 25 digits each)	1	1	1	1
Toll restriction: Denied list, short (10 entries with 25 digits each)	5	5	5	5
Denied list, long (50 entries with 25 digits each)	1	1	1	1
Trunks:				
Total trunks (B channels) in system	60	60	180	180
MSI (analog): Maximum number in system (configuration-dependent)	16	60	120	120
S_0 interfaces: Maximum number in system	10	26	90	90
S_{2M} boards: Maximum number in system	-	1	6	6
TIEL boards: Maximum number in system (four E&M lines per board)	-	-	23	23

PARAMETER	System			
	HiPath 3350 HiPath 3300	HiPath 3550 HiPath 3500	HiPath 3750 HiPath 3700	HiPath 3800
Call waiting:				
Number of telephones per group	8	32	32	32
Total groups per system	8	32	32	32
Call forwarding:				
All calls: Active simultaneously	20	50	150	150
External: Number of CFW keys per telephone	1	1	1	1
External: Number of digits	25-digit + trunk access code			
Announcement before answering:				
Number of callers for whom an announcement can be played simultaneously	30	30	30	30
Announcement devices:				
Number of stations at which the announcement can be played simultaneously	30	30	30	30
Total number in system	1	1	1	1
optiClient Attendant:				
Number of Hold keys per optiClient Attendant	4	4	4	4
Total per group	6	6	6	6
Groups in the system	6	6	6	6
Overflow: Number of calls in queue	30	30	30	30
Classes of service:				
Total number in system	15	15	15	15
Matrix size - day and night - number of trunks	30	30	30	30
Allowed and denied lists	15	15	15	15
Telephone lock:				
Number of digits in a PIN	5	5	5	5
CSTA:				

PARAMETER	System			
	HiPath 3350 HiPath 3300	HiPath 3550 HiPath 3500	HiPath 3750 HiPath 3700	HiPath 3800
Number of applications that can be connected per system (server)	4	4	4	4
Number of simultaneous tasks	16	16	50	50
Number of TDS codes	10	10	10	10
DID numbers:				
Number of digits	11	11	11	11
Remote administration:				
Number of callback destinations	6	6	6	6
Length of PIN	5	5	5	5
Call detail recording:				
Number of entries in the buffer	50	150	300	300
Group call:				
Group call: Number of groups	20	150	800	800
Hotline/hotline after a timeout (code blue):				
Number of destinations	1	6	6	6
Integrated voicemail module EVM:				
EVM modules per system	1	1	-	
Number of access channels	2	2	-	
Number of voicemail cabinets	24	24	-	
Recording capacity	2 h	2 h	-	
Number of personal greetings	2	2	-	
Maximum length of personal greetings	1 min	1 min	-	
Auto attendant function	Yes	Yes	-	
Number of auto attendant mailboxes	4	4	-	
Maximum length of auto attendant mailboxes	2 min	2 min	-	
Number of recorded announcements for UCD (without start/stop)	2	2	-	
Active languages during operation	1	1	-	

PARAMETER	System			
	HiPath 3350 HiPath 3300	HiPath 3550 HiPath 3500	HiPath 3750 HiPath 3700	HiPath 3800
Loadable languages	3	3	-	
Available languages	16	16	-	
Conference:				
Number of participants per conference	5	5	5	5
Total number in system	3	6	6	6
Maximum number of trunks in a conference	4	4	4	4
Station speed dialing (ISD):				
Total entries in system	300	2000	2000	2000
Number of entries per telephone	10	10	10	10
Number of digits per entry	25-digit + trunk access code			
System speed dialing (SSD):				
Total entries in system	1000	1000	1000	1000
Number of digits per entry	25-digit + trunk access code			
Length of names	16	16	16	16
LCR:				
Number of digits dialed	32	32	32	32
Number of digits checked	25-digit + trunk access code			
No. of dial plans (each with max. 10 fields)	514	514	514	514
No. of outdial rules per trunk group	254	254	254	254
Number of routes in a path table	16	16	16	16
Number of path tables.	254	254	254	254
Number of time zones per day	8	8	8	8
Number of digits per outdial rule	40	40	40	40
Trunk queuing (not S_0):				
Number of simultaneous entries	4	32	32	32
Multiple subscriber numbers:				
Number of digits	6	6	6	6

PARAMETER	System			
	HiPath 3350 HiPath 3300	HiPath 3550 HiPath 3500	HiPath 3750 HiPath 3700	HiPath 3800
DTMF DID:				
Number of simultaneous DID actions	3	3	6	6
MUSAP keys:				
Total per telephone	10	10	10	10
Messages:				
Total advisory messages in system	10	10	10	10
Number of messages received on an optiPoint 500 or optiset E telephone with display	5+1	5+1	5+1	5+1
Number of messages received on an optiPoint 500 or optiset E telephone without a display	1+1	1+1	1+1	1+1
Total text messages in system	10	10	10	10
Text messages: Total messages sent in system	15	50	50	50
Length of the text in a customer-defined message	24	24	24	24
Length of the text generated by an optiset E memory telephone	24	24	24	24
Mailbox: Total messages active simultaneously in system (text messages and advisory messages)	30	100	100	100
Name display:				
Internal stations and subscriber groups: Length in letters	16	16	16	16
System speed-dialing entries: Length in letters	16	16	16	16
Trunk groups: Length in letters	10	10	10	10
Park slots:				
Total number in system	10	10	10	10
Account codes:				
Number of verifiable digits				

PARAMETER	System			
	HiPath 3350 HiPath 3300	HiPath 3550 HiPath 3500	HiPath 3750 HiPath 3700	HiPath 3800
Total number in system	1000	1000	1000	1000
Trunk groups:				
Total number in system	8	16	16	16
Trunk group overflow:				
Total per trunk group	1	1	1	1
Callback:				
Number of entries per trunk	4	32	32	32
Number of entries per station	3	3	3	3
Call forwarding (permanently configured in Call Management):				
on RNA / on Busy: Total per telephone	1	1	1	1
Number of CFW destinations per station	3	3	3	3
Group ringing:				
Number of extensions in call ringing group	5	5	5	5
Internal S_0 bus:				
Number of active calls per bus	2	2	2	2
Number of telephones per bus	8	8	8	8
Hunt groups:				
Linear: Total number in system	20	150	800	800
UCD: Total number in system	-	60	60	60
Cyclical: Total number in system	20	150	800	800
Sensors:	4	4	4	4
Languages:				
Total languages active simultaneously in system	4	4	4	4
Total number in system	4	4	4	4
Team/Top				
Total Team/Top configurations	10	50	500*	500*

PARAMETER	System			
	HiPath 3350 HiPath 3300	HiPath 3550 HiPath 3500	HiPath 3750 HiPath 3700	HiPath 3800
Max. number of stations (members) in a Team/Top configuration	8	10	10	10
Max. number of telephones in a Team/ Top configuration	8	10	10	10
Max. number of MULAPs per telephone	10	10	10	10
Subscriber groups:				
Length of names	16	16	16	16
Stations per group	8	20	20	20
Number of groups for group call, hunt groups, announcement zones: Total number in system	20	150	800	800
For MULAP: Total number in system	10	50	500	500
Station numbers:				
Total station numbers in system (incl. group numbers)	60	650	650	650
For analog, ISDN, phone and data adapter: Total number of station numbers in system	20	100	250	250
For groups/hunt groups: Total number of station numbers in system	20	150	800	800
for extensions: Total number of station numbers in system	40	500	500	500
Length of station numbers	6	6	6	6
Length of station numbers (default setting)	2	3	3	3
Internal directory:				
Number of simultaneous accesses	5	5	5	5
Door opener:				
Number of attempts to enter an invalid password before deactivation	5	5	5	5
Length of password (in digits)	5	5	5	5
UCD:				

PARAMETER	System			
	HiPath 3350 HiPath 3300	HiPath 3550 HiPath 3500	HiPath 3750 HiPath 3700	HiPath 3800
Number of priority levels per call type	10	10	10	10
Announcements: Number of announcements per group	7	7	7	7
Groups: Total number in system	10	60	60	60
Overflow: Number of waiting calls per group	3	3	3	3
Queue: Number of calls in a queue	72	72	72	72
Relocation function:				
Simultaneous relocation actions in system	1	1	1	1
Networking:				
Number of trunk group codes	10	10	10	10
Length of a trunk group code	6	6	6	6
Expanded redial:				
Number of entries on an optiPoint 500 or optiset E telephone with a display	3	3	3	3
Last number redial (LNR):				
Number of entries on an optiPoint 500 or optiset E without a display	1	1	1	1
Number of digits stored	25-digit + trunk access code			
Destination keys:				
Number of destinations in system	300	2000	2000	2000
Destination key/station speed dialing:				
Number of destinations in system	300	2000	2000	2000
Number of digits	25-digit + trunk access code			
Call destination lists:				
Number of call destination keys	70	376	500	500

9.1 Overview of Additional Hardware

Table 9-1 System-Specific Maximum Configuration for $U_{P0/E}$ Workpoint Clients, Key Modules, and Adapters

Workpoint Clients, Add-On Devices, Adapters	SYSTEM					
	HiPath 3800[1]	**HiPath 3750 HiPath 3700**	**HiPath 3550**	**HiPath 3500**	**HiPath 3350**	**HiPath 3300**
optiPoint 500 telephones						
• Number per system	384	250/384[2]	72[3]	48[4]	24[5]	24[6]
• Number per box (the value in brackets applies to operation using a PSUI)	192	144 (120)	–	–	–	–
optiPoint acoustic adapters						
Number per system	No limit					
optiPoint analog adapters						
Number per system	116	116[7]	24[8]	24[8]	8[9]	8[9]
optiPoint recorder adapters						
Number per system	No limit					
optiPoint ISDN adapters						
Number per system	116	116[7]	48[8]	48[8]	8[9]	8[9]
optiPoint phone adapters						
Number per system	116	116[7]	48[8]	48[8]	24[9]	24[9]
optiPoint key modules						
Number per system	100	100	100	100	30	30
optiPoint BLF:						
Number per system	12	12	6	6	–	–
optiset E telephones						
• Number per system	384	250/384[2]	72[3]	48[4]	24[5]	24[6]
• Number per box (the value in brackets applies to operation using a PSUI)	192	144 (120)	–	–	–	–
optiset E analog adapters						
Number per system	116	116[7]	24[8]	24[8]	8[9]	8[9]

Table 9-1 System-Specific Maximum Configuration for $U_{P0/E}$ Workpoint Clients, Key Modules, and Adapters

Workpoint Clients, Add-On Devices, Adapters	SYSTEM					
	HiPath 3800[1]	**HiPath 3750 HiPath 3700**	**HiPath 3550**	**HiPath 3500**	**HiPath 3350**	**HiPath 3300**
optiset E control adapters						
Number per system	No limit					
optiset E data adapters						
Number per system	50	50	48	48	16	16
optiset E speech adapters						
Number per system	No limit					
optiset E privacy modules						
Number per system	No limit					
optiset E ISDN adapters						
Number per system	116	116[7]	48[8]	48[8]	8[9]	8[9]
optiset E phone adapters						
Number per system	116	116[7]	48[8]	48[8]	24[9]	24[9]
optiset E key modules						
Number per system	100	100	100	100	30	30
optiset E BLFs						
Number per system	12	12	6	6	–	–

1 Testing is not required on stations and lines up to the maximum configuration. Testing using the project planning tool is mandatory for configurations which include UCD/ACD, more than one SLCN, or groups of more than 10 stations http://intranet.mch4.siemens.de/syseng/perfeng/tools/hpt/index.htm).

2 Depending on system configuration and performance, the specified capacity limits may not always be reached. To ensure that the dynamic capacity limit of HiPath 3750 or HiPath 3700 is not exceeded, the configuration can be tested using the project planning tool (intranet: http://intranet.mch4.siemens.de/syseng/perfeng/tools/hpt/index.htm). Configurations with under 250 stations and 90 trunks do not have to be checked. Testing using the project planning tool is mandatory for configurations which include UCD/ACD, more than one SLC16/SLC16N, or groups of more than 10 stations.

3 8x$U_{P0/E}$ at the central board + 5xSLU8 + 1xSLMO24.

4 8x$U_{P0/E}$ at the central board + 5xSLU8R.

5 8x$U_{P0/E}$ at the central board + 2xSLU8.

6 8x$U_{P0/E}$ at the central board + 2xSLU8R.

7 The total number of $U_{P0/E}$ stations and stations connected using adapters is limited to 384.

8 An EPSU2 external power supply must be used if the total number of $U_{P0/E}$ stations, analog stations, and stations connected using adapters is greater than 72.

9 A UPSC-D/UPSC-DR must be used if the total number of $U_{P0/E}$ stations and stations connected using adapters is greater than 24.

A Identifying System Power Requirement

The following values are for orientation only, and can vary depending on the traffic flow.

This supplement specifies the power requirement of the boards and components of the HiPath 3000 systems. In addition, information is provided on the power requirement of the different workpoint clients, key modules and adapters.

With this information,

- the individual system power requirement can be identified.
- every system configuration can be checked to see whether the nominal output of the power supply unit is sufficient or whether an additional power supply may be needed.

Subject
HiPath 3800 Boards Power Requirement, page A-2
HiPath 3750 and HiPath 3700 Boards Power Requirement, page A-4
HiPath 3550 Boards Power Requirement, page A-6
HiPath 3350 Boards Power Requirement, page A-8
HiPath 3500 Boards Power Requirement, page A-10
HiPath 3300 Boards Power Requirement, page A-11
Workpoint Clients, Key Modules and Adapter Power Requirements, page A-12
Check Whether the Output of a Power Supply Unit is Sufficient, page A-14
Identifying the Primary System Power Requirement, page A-17

To ensure that a system's dynamic capacity limit is not exceeded, the configuration can be tested using the project planning tool (Intranet: http://intranet.mch4.siemens.de/syseng/perfeng/tools/hpt/index.htm).

A.1 HiPath 3800 Boards Power Requirement

Table A-1 Nominal Output of the HiPath 3800 Power Supply Unit

Power supply unit	Part number	Max. Nominal Output in W	
		5 V	–48 V
LUNA2	S30122-K7686-L1 S30122-K7686-M1	140[1]	

1 The total max. nominal output at the 5-V and at the –48-V output is 140 W. The 5-V nominal output can vary between 30 and 60 W and the –48-V nominal output can vary between 80 and 110 W. In other words, if 30 W are withdrawn at the 5-V output, a maximum of 110 W is available at the –48-V output.

You must check whether the total power requirement of the boards used and the connected workpoint clients of a system cabinet exceeds the maximum possible LUNA2 output. Section A.8 contains a sample calculation.

Table A-2 HiPath 3800 Board Power Requirement

Board or Component	Part number	Net Power Requirement in W	
		5 V	–48 V
CBSAP	S30810-Q2314-X	10.0	–
DBSAP	S30807-Q6722-X	1.5	–
DIU2U	S30810-Q2216-X	5.1	–
DIUN2	S30810-Q2196-X	5.0	–
IVMN8	S30122-H7688-X100	10.0	–
IVMNL	S30122-H7688-X	10.0	–
PDMX	S30807-Q5697-X200	3.0	–
REALS	S30807-Q6629-X	1.5	–
SLCN	S30810-Q2193-X300	5.0	–
SLMA	S30810-Q2191-C300	1.6	12.0
SLMA8	S30810-Q2191-C100	0.6	4.0
SLMO2	S30810-Q2168-X10	1.0	1.2
SLMO8	S30810-Q2168-X100	0.4	0.4
STMD3	S30810-Q2217-X10	4.0	–
	S30810-Q2217-X110	4.0	1.5
STMI2	S30810-Q2316-X100	16.3	–

Table A-2 HiPath 3800 Board Power Requirement

Board or Component	Part number	Net Power Requirement in W	
		5 V	–48 V
TM2LP	S30810-Q2159-Xxxx	1.8	–
TMC16	S30810-Q2485-X	1.3	–
TMDID	S30810-Q2452-X	2.3	6.6
TMEW2	S30810-Q2292-X100	1.3	3.1

A.2 HiPath 3750 and HiPath 3700 Boards Power Requirement

Table A-3 Nominal output of the power supply unit HiPath 3750and HiPath 3700

Power supply unit	Part number	Max. Nominal Output in W	
		5 V	–48 V
UPSM	S30122-K5950-A100 S30122-K5950-S100 S30122-K5959-S121 (for RSA only)	60.0	166.0

You must check whether the total power requirement of the boards used and the connected workpoint clients of a system box exceeds the maximum possible UPSM output. Section A.8 contains a sample calculation.

Table A-4 HiPath 3750 and HiPath 3700 Boards Power Requirement

Board or Component	Part number	Net Power Requirement in W	
		5 V	–48 V
BS3/1	S30807-H5482-X	–	2.0
BS3/3	S30807-H5485-X	–	3.0
CBCPR (including sub-boards)	S30810-Q2936-X	8.5	–
GEE8	S30817-Q664-xxxx	1.0	–
HXGM3	S30810-Q2942-X	12.0	–
IVML8	S30122-X7380-X100	3.0	0.7
IVML24	S30122-X7380-X	5.0	1.0
PDM1	S30807-Q5692-X100	–	5.0
REAL	S30807-Q5913-X	0.5	–
SLA8N	S30810-Q2929-X200	1.5	1.5
SLA16N	S30810-Q2929-X100	3.0	3.0
SLA24N	S30810-Q2929-X	4.5	4.5
SLC16	S30810-Q2922-X	8.0	–
SLC16N	S30810-Q2193-X100	5.0	–
SLMO8	S30810-Q2901-X100	0.7	–
SLMO24	S30810-Q2901-X	1.5	–

Table A-4 HiPath 3750 and HiPath 3700 Boards Power Requirement

Board or Component	Part number	Net Power Requirement in W	
		5 V	–48 V
STMD8	S30810-Q2558-X200	2.0	–
TIEL	S30810-Q2520-X	1.0	–
TMAMF	S30810-Q2587-A200	1.8[1]	16.9[1]
TMCAS	S30810-Q2938-X	Not Available	
TMDID8	S30810-Q2507-X	1.4[1]	23.8[1]
TMGL8	S30810-Q2703-X	1.6[1]	2.1[1]
TML8W	S30817-Q626-Axxx/Bxxx	1.0	–
TMST1	S30810-Q2920-X	3.0	–
TS2	S30810-Q2915-X	3.0	–

1 Identified at a traffic flow of 0.8 Erlang

A.3 HiPath 3550 Boards Power Requirement

Table A-5 Nominal Output of the HiPath 3550 Power Supply Units

Power supply unit	Part number	Max. Nominal Output in W	
		5 V	–48 V
UPSC-D	S30122-K5660-M300	40.0	53.0
UPSC-D with EPSU2	S30122-K5660-M300 with S30122-K7221-X2	40.0	140.0

You must check whether the total power requirement of the boards used and the connected workpoint clients exceeds the maximum possible output of the UPSC-D with or without EPSU2. Section A.8 contains a sample calculation.

Table A-6 HiPath 3550 Board Power Requirement

Board or Component	Part number	Net Power Requirement in W	
		5 V	–48 V
BS3/1	S30807-H5482-X	–	2.0
BS3/3	S30807-H5485-X	–	3.0
CBCC (including submodules)	S30810-Q2935-A301	7.0	0.5
GEE12	S30817-Q951-Axxx	0.5	–
GEE16	S30817-Q951-Axxx	0.5	–
GEE50	S30817-Q951-Axxx	0.5	–
HXGS3 (including ventilator kit)	S30810-Q2943-X	10.0	2.8
HXGS3 (excluding ventilator kit)	S30810-Q2943-X	10.0	–
IVMS8	S30122-Q7379-X	2.6	0.3
PDM1	S30807-Q5692-X100	–	5.0
SLA8N	S30810-Q2929-X200	0.2	0.5
SLA16N	S30810-Q2929-X100	3.0	3.0
SLA24N	S30810-Q2929-X	4.5	4.5
SLC16	S30810-Q2922-X	8.0	–
SLC16N	S30810-Q2193-X100	5.0	–

Table A-6 HiPath 3550 Board Power Requirement

Board or Component	Part number	Net Power Requirement in W	
		5 V	–48 V
SLMO24	S30810-Q2901-X	1.5	–
SLU8	S30817-Q922-A301	0.8	–
STLS2	S30817-Q924-B313	0.6	–
STLS4	S30817-Q924-A313	1.0	–
STRB	S30817-Q932-A	0.5	–
TLA2	S30817-Q923-Bxxx	0.1	–
TLA4	S30817-Q923-Axxx	0.2	–
TLA8	S30817-Q926-Axxx	0.4	–
TMAMF	S30810-Q2587-A400	1.8[1]	16.9
TMCAS	S30810-Q2938-X	Not Available	
TMGL4	S30810-Q2918-X	4.7	0.1
TMQ4	S30810-Q2917-X	3.8	–
TST1	S30810-Q2919-X	0.8	–
TS2	S30810-Q2913-X300	0.9	–
V24/1	S30807-Q6916-X100	0.3	–
4SLA	S30810-Q2923-X200	0.7	0.7
8SLA	S30810-Q2923-X100	1.3	1.3
16SLA	S30810-Q2923-X	2.5	2.5

1 Identified at a traffic flow of 0.8 Erlang

A.4 HiPath 3350 Boards Power Requirement

Table A-7 Nominal Output of the HiPath 3350 Power Supply Units

Power supply unit	Part number	Max. Nominal Output in W	
		5 V	–48 V
PSUP	S30122-K5658-M	15.0	19.2
UPSC-D	S30122-K5660-M300	20.0[1]	53.0
UPSC-D with EPSU2	S30122-K5660-M300 with S30122-K7221-X2	40.0	140.0

1 Nominal output = 40 W. Due to build-up of heat, not more than 20 W may be withdrawn.

You must check whether the total power requirement of the boards used and the connected workpoint clients exceeds the maximum possible output of the PSUP or the UPSC-D with or without EPSU2. Section A.8 contains a sample calculation.

Table A-8 HiPath 3350 Board Power Requirement

Board or Component	Part number	Net Power Requirement in W	
		5 V	–48 V
BS3/1	S30807-H5482-X	–	2.0
BS3/3	S30807-H5485-X	–	3.0
CBCC (including submodules)	S30810-Q2935-A301	7.0	0.5
GEE12	S30817-Q951-Axxx	0.5	–
GEE16	S30817-Q951-Axxx	0.5	–
GEE50	S30817-Q951-Axxx	0.5	–
HXGS3 (including ventilator kit)	S30810-Q2943-X	10.0	2.8
IVMP8	S30122-Q7379-X100	2.6	0.3
PDM1	S30807-Q5692-X100	–	5.0
SLU8	S30817-Q922-A301	0.8	–
STLS2	S30817-Q924-B313	0.6	–
STLS4	S30817-Q924-A313	1.0	–
STRB	S30817-Q932-A	0.5	–
TLA2	S30817-Q923-Bxxx	0.1	–

Table A-8 HiPath 3350 Board Power Requirement

Board or Component	Part number	Net Power Requirement in W	
		5 V	–48 V
TLA4	S30817-Q923-Axxx	0.2	–
TLA8	S30817-Q926-Axxx	0.4	–
TMGL4	S30810-Q2918-X	4.7[1]	0.1[1]
TMQ4	S30810-Q2917-X	3.8	–
V24/1	S30807-Q6916-X100	0.3	–
4SLA	S30810-Q2923-X200	0.7	0.7
8SLA	S30810-Q2923-X100	1.3	1.3
16SLA	S30810-Q2923-X	2.5	2.5

1 Identified at a traffic flow of 0.8 Erlang

A.5 HiPath 3500 Boards Power Requirement

Table A-9 Nominal Output of the HiPath 3500 Power Supply Units

Power supply unit	Part number	Max. Nominal Output in W	
		5 V	–48 V
UPSC-DR	S30122-K7373-M900	40.0	53.0
UPSC-DR with EPSU2-R[1]	S30122-K7373-M900 with S30122-K7221-X900	40.0	140.0

1 Installed in expansion box EBR S30777-U711-E901

You must check whether the total power requirement of the boards used and the connected workpoint clients exceeds the maximum possible output of the UPSC-DR with or without EPSU2-R. Section A.8 contains a sample calculation.

Table A-10 HiPath 3500 Board Power Requirement

Board or Component	Part number	Net Power Requirement in W	
		5 V	–48 V
BS3/1	S30807-H5482-X	–	2.0
BS3/3	S30807-H5485-X	–	3.0
CBRC (including submodules)	S30810-K2935-Z301	7.0	0.5
HXGR3	S30810-K2943-Z	10.0	–
IVMS8R	S30122-K7379-Z	2.6	0.3
HiPath 3500 ventilator	–	–	1.4
PDM1	S30807-Q5692-X100	–	5.0
SLU8R	S30817-K922-Z301	0.8	–
STLS4R	S30817-K924-Z313	1.0	–
STRBR	S30817-Q932-Z	0.5	–
TLA4R	S30817-Q923-Zxxx	0.2	–
TMGL4R	S30810-K2918-Z	5.7[1]	0.1
TST1	S30810-K2919-Z	0.8	–
TS2R	S30810-K2913-Z300	0.9	–
8SLAR	S30810-K2925-Z	1.3	1.3

1 Identified at a traffic flow of 0.8 Erlang

A.6 HiPath 3300 Boards Power Requirement

Table A-11 Nominal Output of the HiPath 3300 Power Supply Units

Power supply unit	Part number	Max. Nominal Output in W	
		5 V	–48 V
UPSC-DR	S30122-K7373-M900	20.0[1]	53.0
UPSC-DR with EPSU2-R[2]	S30122-K7373-M900 with S30122-K7221-X900	40.0	140.0

1 Nominal output = 40 W. Due to build-up of heat, not more than 20 W may be withdrawn.
2 Installed in expansion box EBR S30777-U711-E901

You must check whether the total power requirement of the boards used and the connected workpoint clients exceeds the maximum possible output of the UPSC-DR with or without EPSU2-R. A sample calculation is shown in Section A.8.

Table A-12 HiPath 3300 Board Power Requirement

Board or Component	Part number	Net Power Requirement in W	
		5 V	–48 V
BS3/1	S30807-H5482-X	–	2.0
BS3/3	S30807-H5485-X	–	3.0
CBRC (including submodules)	S30810-K2935-Z301	7.0	0.5
HXGR3	S30810-K2943-Z	10.0	–
IVMP8R	S30122-K7379-Z100	2.6	0.3
HiPath 3300 ventilator	–	–	1.4
PDM1	S30807-Q5692-X100	–	5.0
SLU8R	S30817-K922-Z301	0.8	–
STLS4R	S30817-K924-Z313	1.0	–
STRBR	S30817-Q932-Z	0.5	–
TLA4R	S30817-Q923-Zxxx	0.2	–
TMGL4R	S30810-K2918-Z	5.7[1]	0.1
8SLAR	S30810-K2925-Z	1.3	1.3

1 Identified at a traffic flow of 0.8 Erlang

A.7 Workpoint Clients, Key Modules and Adapter Power Requirements

An average power requirement is specified, which is identified at a traffic flow of 0.15 Erlang.

Table A-13 Workpoint Clients, Key Modules and Adapter Power Requirements

Workpoint Client		Net Power Requirement in W (from –48 V input)
optiPoint 410 optiPoint 420	optiPoint 410 entry	0.0[1]
	optiPoint 410 economy	
	optiPoint 410 standard	
	optiPoint 410 advance	
	optiPoint 420 economy	
	optiPoint 420 economy plus	
	optiPoint 420 standard	
	optiPoint 420 advance	
	optiPoint SLK module	
	optiPoint 410 display module	
optiPoint 500	optiPoint 500 entry	0.3
	optiPoint 500 economy (not for U.S.)	0.7
	optiPoint 500 basic	0.7
	optiPoint 500 standard	0.7
	optiPoint 500 advance	0.72
	optiPoint key module	0.05
	optiPoint BLF	0.0[2]
	optiPoint analog adapter	0.00[3]
	optiPoint ISDN adapter	0.7
	optiPoint phone adapter	0.18
	optiPoint acoustic adapter	0.25
	optiPoint recorder adapter	0.3
optiPoint 600 office		0.0[2]

Table A-13 Workpoint Clients, Key Modules and Adapter Power Requirements

Workpoint Client		Net Power Requirement in W (from –48 V input)
optiset E	optiset E entry	0.36
	optiset E basic	0.36
	optiset E standard	0.41
	optiset E advance plus/comfort	0.43
	optiset E advance conference/conference	0.85
	optiset E memory	0.56
	optiset E key Module	0.06
	Hicom Attendant BLF	0.0[2]
	optiset E acoustic adapter	0.02
	optiset E analog adapter	0.0[3]
	optiset E contact adapter	0.7
	optiset E control adapters	0.34
	optiset E data adapter	0.76
	optiset E headset adapter	0.03
	optiset E headset plus adapter	0.23
	optiset E ISDN adapter	0.05
	optiset E phone adapter	0.06
Analog telephone (40 mA for short trunk) in active status		0.3

1 Power over LAN (in accordance with Cisco and the pre802.3af standard) or power supply is provided via a local power supply unit.
2 Power is provided by a local power supply.
3 A local power supply provides power to the connected analog telephone.

A.8 Check Whether the Output of a Power Supply Unit is Sufficient

Apart from the secondary power requirements, the power output must also be checked to ensure that the maximum possible output of the system's power supply unit is sufficient. For this, the power requirement on the 5 V output format and on the –48 V output format must be examined separately.

A separate calculation must be performed for every HiPath 3750 and HiPath 3700 system box (UPSM).

> **Caution**
> To guarantee smooth system operation, the nominal output of the power supply unit at the 5 V output and at the –48 V output must be greater than the respective secondary power requirement.

Procedure

Proceed as follows to identify the secondary power requirement of a system:

1. Determine secondary power requirement at the 5 V output

   5 V power requirement of the boards/components used

   = secondary power requirement at the 5 V output

2. Determine secondary power requirement at the –48 V output

   –48 V power requirement of the boards/components used

   \+ power requirement of connected workpoint clients (analog and digital telephones), key modules and adapters

   ---

   = secondary power requirement at the –48 V output

Using the specified values, check whether the total power requirement exceeds the maximum possible output of the power supply unit at the 5 V output or at the –48 V output. If this is the case, you have the following options:

- HiPath 3800
  The number of LUNA2 power supply units can be increased.
- HiPath 3750 and HiPath 3700 with UPSM
  For multiple box systems, the distribution of boards on the system boxes can be optimized. Please observe the configuration notes in the service manual.

- HiPath 3550 with USPSC-D
  The maximum nominal output at the –48 V output can be increased from 53 W to 140 W by using the EPSU2 external power supply unit.
- HiPath 3350 with USPSC-D
  Due to build-up of heat, the 5 V output format can only be loaded with a maximum of 20 W. A maximum nominal output of 40 W is possible by using the EPSU2 external power supply unit. In addition, the maximum nominal output of the –48 V output increases from 53 W to 140 W.
- HiPath 3500 with UPSC-DR
  The maximum nominal output of the –48 V output can be increased from 53 W to 140 W by using the EPSU2-R external power supply unit.
- HiPath 3300 with USPSC-DR
  Due to build-up of heat, the 5 V output format can only be loaded with a maximum of 20 W. A maximum nominal output of 40 W is possible by using the EPSU2-R external power supply unit. In addition, the maximum nominal output of the –48 V output increases from 53 W to 140 W.

Sample calculation for a HiPath 3550

1. Determine secondary power requirement at the 5 V output

power requirements of the boards/ components used =	7.00 W	1 x CBCC
	10.00 W	1 x HXGS3 (including ventilator kit)
	0.90 W	1 x TS2
	2.40 W	3 x SLU8
	1.30 W	1 x 8SLA
	5.00 W	1 x SLC16N
	0.00 W	12 x BS3/1
= secondary power requirement at the 5 V output =	26.60 W	

The maximum nominal output of UPSC-D at the –5 V output amounts to 40 W and is enough to cover the specified power requirement.

2. Determine secondary power requirement at the –48 V output

	power requirements of the boards/ components used =	0.50 W	1 x CBCC
		2.80 W	1 x HXGS3 (including ventilator kit)
		0.00 W	1 x TS2
		0.00 W	3 x SLU8
		1.30 W	1 x 8SLA
		0.00 W	1 x SLC16N
		24.00 W	12 x BS3/1
+	power requirement of connected workpoint clients, key modules and adapters =	0.56 W	1 x optiset E memory
		4.32 W	6 x optiPoint 500 advance
		0.85 W	1 x optiset E advance conference/conference
		8.40 W	12 x optiPoint 500 basic
		2.40 W	8 x optiPoint 500 entry
		0.00 W	2 x Hicom Attendant BLF
		0.00 W	2 x optiPoint BLF
		0.40 W	8 x optiPoint key module
		0.50 W	2 x optiPoint acoustic adapter
		1.80 W	6 x analog telephones
=	secondary power requirement at the 48 V output =	47.83 W	

The maximum nominal output of UPSC-D at the –48 V output amounts to 53 W and is enough to cover the specified power requirement.

A.9 Identifying the Primary System Power Requirement

Procedure

Proceed as follows to identify the primary power requirement of a system:

1. Determine overall secondary power requirement

   power requirements of the boards/components used

   \+ power requirement of connected workpoint clients (analog and digital telephones), key modules and adapters

   ---

   = overall secondary power requirement

2. Identifying primary power requirement

   overall secondary power requirement

   \+ requirements of power supply units (UPSM = 30 W, PSUP/UPSC-D/UPSC-DR = 12 W each)

   \+ requirements of EPSU2/EPSU2R (10 W each)

   = the result should be multiplied by the factor 1.2 to allow for the degree of efficiency of the power supply.

Sample calculation for a HiPath 3550

1. Determine overall secondary power requirement

	power requirements of the boards/ components used =	7.50 W	1 x CBCC
		12.80 W	1 x HXGS3 (including ventilator kit)
		0.90 W	1 x TS2
		2.40 W	3 x SLU8
		2.60 W	1 x 8SLA
		5.00 W	1 x SLC16N
		24.00 W	12 x BS3/1
+	power requirement of connected workpoint clients, key modules and adapters =	0.56 W	1 x optiset E memory
		4.32 W	6 x optiPoint 500 advance
		0.85 W	1 x optiset E advance conference/conference
		8.40 W	12 x optiPoint 500 basic
		2.40 W	8 x optiPoint 500 entry
		0.00 W	2 x Hicom Attendant BLF
		0.00 W	2 x optiPoint BLF
		0.40 W	8 x optiPoint key module
		0.50 W	2 x optiPoint acoustic adapter
		1.80 W	6 x analog workpoint clients
=	overall secondary power requirement =	74.43 W	

2. Identifying primary power requirement

	overall secondary power requirement =	74.43 W	
+	UPSC-D requirement =	12.00 W	
	Allow for the degree of efficiency of the power supply unit:	86.43 W	x 1.2 = 103.7 W

The primary power requirement of HiPath 3550 with the expansion mentioned amounts to approximately 103.7 W.

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